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Editorial

We last produced a themed issue on the Gorge in 1987, and much has changed since then. The theme of this issue is much more the natural history of the Downs plateau rather than the Gorge itself. There is now much more concern by the fate of invertebrates, and their relationship to the plants, and hence to the mowing and management which in part controls the plants that survive. The birds also depend in part upon the invertebrates for food, but also upon the plant structure, because one of the major themes of the past twenty five years is the rapid extension across the Downs surface of scrub which reduces grass cover, but increases feeding and nesting opportunities.

The Downs management has become much more environmentally aware. The Downs is not a park but a unique wildlife site, parts being an SSSI, managed by sheep for a thousand years, and creating an assemblage of special plants found together nowhere else. The Downs Committee have successfully managed the delicate balancing act between finance, human demands, problems of access and parking, and ensuring the future of its wildlife. And the Clifton Zoo education department has played a vital role in widening public understanding.

Most changes have been very positive, but as ever there are many threats, and the recent and continuing economic crisis means that there is too little money available to ensure that management can cope with all of them. The Downs Ranger's team work wonders, and work cheerfully in all weathers, and at all hours, and the fact that the Downs always look spotlessly clean and green is down to them.

We have never before printed in colour, but some of the articles would not have worked without illustrations in place.

We do not normally include obituaries of non-members, but the sudden death of Justin Smith in the middle of 2014 stunned everyone who had known him. He was never a member of the Society, but participated in many of its activities, was known to many and was very significant in the development of conservation in the city. His huge understanding of the natural world will be deeply missed, and it is fitting that an appreciation of his life is published here.

It is the fate of the very old to be forgotten, and I am delighted to be able to print an obituary of Dr Geoffrey Kellaway who died at the age of 99, and who played a major role in the interpretation of the geology of the area, and even posited a solution to the problem of the Stonehenge Bluestones.

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The Geology of Clifton and Durdham Downs

Andrew Mathieson

Little has been written about the geology of the Downs, in contrast to the many accounts of that of the Avon Gorge. This is hardly surprising since the Gorge is nationally important for both the exposed rock sequence and the landform itself, but the Downs do have a number of different and special geological features. The two sites are very closely linked since most of the rocks seen in the Gorge also lie under the Downs, but there are several younger rocks on the Downs which are not found in the Gorge, and these add greatly to our understanding of the geological history of the area.

The Rock Succession

The oldest group of rocks on the Downs is the Carboniferous Limestone, and this underlies most of the area. It is a thick sequence of some 760 m (2,500 ft) of rock, and is mostly made up of different types of limestone, but there are also dolomites, mudstones and sandstones. These all contain the fossil brachiopod shellfish, corals and crinoids, clearly indicating that the rocks formed beneath the sea. The presence of corals and limestone suggests that the water was shallow and warm, and this is supported by studies of palaeomagnetism, which indicate that these rocks formed close to the equator. Radiometric evidence shows that they are between 359 and 343 million years old.

The sequence of Carboniferous Limestone is divided into a series of units, which are mostly named after exposures seen along the Gorge (Kellaway and Welch, 1955). These units were created by the Geological Survey to replace a system of zones based on fossil corals and brachiopods (Vaughan, 1905) which, although revolutionary at the time, had been found to be difficult to use outside the Bristol area. The new system is based on units of types of rock which can be traced across the area from the Mendips to South Gloucestershire. The Gorge is famous as the reference site for both of these methods of dividing the limestone succession (Bradshaw and Frey, 1987; Hawkins, 1987).

The main Geological Survey units present on the Downs are:

Black Rock Limestone is the oldest unit, and it can be traced in a band across the north of the Downs from Sea Walls to Badminton School, and forms the northern edge of the high ground. It takes its name from Black Rock Quarry in the Gorge, where it is well exposed, and is a dark grey, well bedded limestone with many fossil crinoids, corals and brachiopods.

Gully Oolite outcrops across the Downs to the south and parallel to the Black Rock Limestone from near the top of the Gully. It is a light grey coloured oolitic limestone, with few fossils and little evidence of bedding. The rock is best seen in the Gully Quarry in the Gorge. Modern day oolite sediments are found in shallow seas subject to bottom currents.

Clifton Down Mudstone is a relatively softer rock and its course across the Downs runs parallel to the other older rocks, starting from where it was eroded out to form the top of the Gully. The rock is poorly exposed in the Gorge but its base can be seen at the top of the Gully Quarry. The contact with the Gully Oolite beneath is irregular, suggesting that erosion took place at that time and the junction between the units is interpreted as a fossil soil. The presence of mudstones indicates that mud was washed into the sea by rivers from nearby land, but there are also beds of limestone which show that the seawater cleared at times.

Clifton Down Limestone is found both on Durdham and Clifton Downs, since it was displaced by large scale faulting. It is rich in fossils and is sometimes oolitic. There are also some fossil algal structures which suggests an inter-tidal origin for some of the rock.

Hotwells Limestone is again found on both Durdham Down and on the south side of Clifton Down due to the action of the same faulting. It is a well bedded limestone, rich in fossil corals and shellfish, and is best exposed around the foot of the Old Zigzag and the entrance to the former Clifton Rocks Railway. The Upper Cromhall Sandstone, at the top of this unit, is not actually present on the Downs, but is well exposed at the bottom of Bridge Valley Road, and mainly consists of red sandstones and mudstones.

All these rocks in the Gorge and on the Downs were subjected to enormous forces during a major period of earth movements around the end of the Carboniferous period, about 300 million years ago. They were compressed and became part of a massive arched fold (the Westbury-on-Trym Anticline), which extended from Clifton northwards to Kingsweston and Henbury. In addition a number of faults were formed and the largest of these, the Great Fault, can be seen at the bottom of Bridge Valley Road. Here Clifton Down Limestone is pushed up over Cromhall Sandstone with the result that the upper part of the rock sequence in the Gorge (and on the Downs) is repeated to the south. The movement of this major fault is calculated as 335 m (1,100 ft), and it has had the effect of extending the length of the Downs (and the Gorge) by about a third. These earth movements also created sets of joints in the rocks and some of these have since been filled with younger rocks or mineral veins.

The fold must have also included a thick sequence of younger Carboniferous rocks which once covered the Limestone on the Downs. These Coal Measure rocks are found beneath Ashton Vale, where coal seams are found in mudstones and sandstones, and must have been deposited in the equivalent of the tropical rain forest of 315 million years ago. The local Coal Measures are some 600 m (2,000 ft) thick, but much more was probably once present and when they lay on top of the Limestone in the fold, the Downs area must have been on the southern slope of a mountain which could have been over 3,000 m (10,000 ft) high at Westbury on Trym. There followed nearly 100 million years of erosion which almost completely removed the mountain, leaving the Downs and Kingsweston Hill as the highest remaining stumps.

Much of the south of the Downs is covered by Dolomitic Conglomerate, a rock composed of pebbles and boulders of limestone in a matrix of sandstone and mudstone. This was created from the eroded remains of the Carboniferous Limestone. The best exposure of this rock is in a cutting on Bridge Valley Road, where it can be seen to lie in horizontal layers. This appears to represent the infill of a fossil valley cut into the relatively softer Cromhall Sandstone. The rock was formed between 250 and 200 million years ago, in the Triassic period of geological time, when the Downs are thought to have been an area of high ground in an arid desert.

There are some areas of younger Triassic rocks on the Downs. Westbury Beds are found around Clay Pit Road, where they were quarried in the 1780's (Savage, 1999), and also near the centre of Durdham Down. These black coloured mudstones contains fossils which indicate a marine origin, and provide evidence that at least some of the eroded surface of the desert landscape was covered by the sea about 200 million years ago.

The Downs Island

The fossil remains of the "Bristol Dinosaur" *Thecodontosaurus antiquus* were found in a fissure in a limestone quarry on the edge of the Downs, near the top of Blackboy Hill, in 1834. A quarryman took one or two fragments of fossil bone to the Bristol Institution (which later became Bristol City Museum) where they were examined by the curator and by a number of experts. Men were employed to find more fossils and a large collection was made. This dinosaur was only the fourth named in England, and perhaps the world (Benton, 2012). Sadly some of the fossils were destroyed by bomb damage in the Second World War but 184 specimens are still safely stored in the Geology Department of the City Museum and Art Gallery. It was generally thought that the bones were preserved in Dolomitic Conglomerate which had formed in the fissure, but recent research has found evidence that the fissure fill is equivalent in age to the Westbury Beds. This is based on the presence of some fossil shark teeth and the similarity of many of the fossils to those found in South Gloucestershire

where evidence of Westbury Beds was established. The same research revealed fossil evidence for a number of other dinosaurs and terrestrial reptiles which must have lived alongside Thecodontosaurus on the Downs Island of the time (Foffa, 2014).

Near the Bristol entrance to the Suspension Bridge there is a small deposit of more Triassic, and possibly also Jurassic rock, which appears to have been deposited in a cave or fissure in the Carboniferous Limestone. Tawney (1875, p. 164) described this deposit as: *a wide fissure (or pocket) in which blocks of Cotham-marble are found imbedded. Lias Septaria too were dug out of it in making the road to the bridge and the excavations for the bridge chains. The bulk of the infilling material seems to be greenish marl, with a little red marl such as occurs in the Rhaetics.*

Cotham Marble is found in the Cotham Beds, which are of Triassic age, and younger than the Westbury Beds. The Marble is a well-known local limestone formed by fossil algae, suggesting inter-tidal conditions. The Cotham Beds have not been recorded elsewhere on the Downs. The Lias mentioned by Tawney is the lowest division of the local Jurassic rocks. These occurrences imply that the site was on the shoreline of an island, sited where the Downs are today, which existed from the time when the Cotham Beds were deposited through to the early Jurassic period.

Charles Moore (1881) later wrote about the same site: *Close to the toll house, on the Clifton side, there is a deposit of considerable interest, having a face of about forty feet, in which the Rhaetic bone-bed and its associated remains are present. It is partly composed of irony and yellow sandy looking marl, with many free crystals of carbonate of lime, and there are patches of finely laminated rock, similar to the Rhaetic "White Lias".... The bone-bed is two inches thick, with teeth of Saurichthys apicalis, Lophodus minimus, and many fish scales, and the clay on either side contains fish-remains of the same age.*

The Bone Bed with its various fossil fish remains is found in the Westbury Beds, which suggests that the coast existed from before the Cotham Beds were formed. It is thought that the Island was completely drowned by the sea later in the Jurassic period, since pieces of Lias limestone with fossil Gryphaea and Spiriferina have been found on the Downs (Donovan and Kellaway, 1984, p. 20). These are presumably derived from Jurassic deposits hidden beneath the soil.

Durdham Down Bone Cave

The youngest deposits on the Downs were found in the famous Durdham Down Bone Cave. According to Latimer (1887, pp 265-266): *An interesting geological discovery was made in November 1842, in one of the quarries which then worked in the middle of Durdham Down, the workmen having found an opening into a cavern containing a quantity of the remains of animals for ages extinct in this country. The cavity though narrow, was of some extent, being traceable to a depth of ninety feet.*

The bones had belonged to about twelve hyenas, a bear, two rhinoceros, several hippopotami, numerous examples of wild bulls, about five deer, and five or six elephants, besides the relics of animals of later date. The bones were nearly all fractured into small pieces, and the proportion of teeth and horns to other parts of the body greatly preponderated. Taking this fact into consideration, together with the marks of gnawing on the bones, and the certainty that the cave could not have accommodated more than a small fraction of the animals represented by the vestiges, scientific observers concluded that the den had been the retreat of hyenas, which had carried to it portions of their prey.

The fauna mainly represents animals which lived in the last warm phase of the Ice Ages (Ipswichian interglacial, between 128,000 and 116,000 years ago). Much of the material was acquired by the Bristol Institution, which later became Bristol Museum, and some was lost in the Blitz of 1940. Despite reports that this entire collection had been lost from the Museum as a result of the event, on the contrary, there is a significant collection present today, including:

Spotted Hyaena *Crocota crocuta* (including a specimen on display)

Cave Bear *Ursus spelaeus*

Brown Bear *Ursus arctos*

Small-nosed Rhinoceros *Rhinoceros leptorhinus*

Hippopotamus *Hippopotamus amphibius*

'Cattle' or Bison *Bos sp* or *Bison sp*

Deer *Cervus*

Straight-Tusked Elephant *Palaeoloxodon antiquus* (including a specimen on display)

Red Fox *Vulpes vulpes*

Grey Wolf *Canis lupus*

A model of the cave is also preserved in the Geology Department of the City Museum and Art Gallery.

Natural Landscape

The Downs plateau is a remarkable feature which extends across the area at a height of around 100m (330 ft) above sea level, and can be seen to continue across the other side of the Gorge. Most geologists have concluded that it is an ancient surface formed following the very long period of erosion after the late Carboniferous earth movements. They consider that it was planed off at the end of the Triassic and beginning of the Jurassic periods, as the sea advanced across the area. There is certainly evidence for marine sediments of this age on and around the edge of the Downs. The area is then thought to have been covered with a very thick sequence of younger Jurassic and possibly Cretaceous rocks, which would have completely buried the erosion surface. These would have been affected by earth movements in the Tertiary

period, with the result that they dip at a low angle towards the south east. Subsequent erosion has removed most of these rocks and exhumed the buried Triassic landscape.

It is likely that this long period of erosion had some effect on the Downs plateau, and also possible that the postulated presence of an ice sheet during the Ice Ages made further changes. The erosion of the Gully and the New Zigzag valleys must have taken place when the Gorge was created. Given that these are now dry valleys, and that any rainwater that falls on the Downs sinks down through the limestone, it probably required the ground to be frozen to allow water to run across the land surface to erode the features. This could have happened during any of the cold phases of the Ice Ages, but the present shape of the valleys was no doubt completed in the last, the Devensian, between 116,000 and 11,000 years ago.

There are a number of caves in the area but most are found in the sides of the Gorge. However, the Observatory Hill Cave entrance is on Clifton Down, to the east of Observatory Hill. Its entrance has been blocked up, but it was reported to be 9 m (30 ft) long, 1.5 m (5 ft) high and 3 m (10 ft) wide. There is no known evidence of when it was formed. The Durdham Down Bone Cave was discovered in a quarry but must have once had an entrance on the Downs. There may well be more undiscovered caves and solution cavities on the Downs which were formed as rainwater found its way down through joints and other openings in the limestone. There are several small depressions on the Downs which could be sink holes, but which may turn out to be unrecorded mineral workings. One pit is thought to be a Second World War bomb crater.

It has been suggested that much of the surface of the Downs was formerly covered by limestone boulders and griked bedrock, and that this was mostly removed by lime burners or as ornamental stone for use in rockeries (Kellaway and Welch, 1993, p. 48). Clearly the natural landscape has been considerably altered by quarrying and mining.

Quarrying

There have been many quarries which extracted Carboniferous Limestone on the Downs (see the map in Greenacre, The Downs History Trails No. 1). In 1754 it was reported that locals were permitted to take what stone they required from the Downs, and that much was burnt in kilns to make lime for mortar (Savage, 1999). Some was also used as building stone, with the Observatory, for example, almost entirely built of this rock. The only two quarries which have survived are around Observatory Hill.

In addition to the many small quarries there were four much larger:

1. Quarry north of Westbury Road and marked by the Seven Sisters pine trees
2. Quarry to the north west of the junction of Stoke Road and Ladies Mile
3. Chain Quarry, north of Belgrave Road
4. Pembroke Road Quarry, north of Clifton Down

Quarry 1 was reported as being nearly 1.2 hectares (3 acres) in area with an average depth of 9 m (30 ft). Quarry 2 is thought to be the site of the Durdham Down Bone Cave, and had an area of nearly 1.6 hectares (4 acres) and also an average depth of 9 m (30 ft). This appears to be the quarry depicted in a watercolour by William Arnee Frank (1862), and, if so, seems to have been much deeper in part. The Clifton and Durdham Downs (Bristol) Act of 1861 established a number of duties, including the closure and infilling of existing quarries. One of the Downs Committee's first actions was to give notice to all quarry users to quit by October 1862. In 1866 the Docks Engineer proposed to the Downs Committee that these now disused quarries should be infilled with the material to be excavated when straightening the course of the River Avon and constructing a new lock at the entrance to Cumberland Basin. This was agreed and the Dock Spoil Tramway was built to carry the excavated material up onto the Downs.

By October 1871 Quarries 1 and 2 were filled and landfill began at the Chain Quarry. The clump of pines known as the Seven Sisters was planted at the site of Quarry 1 in 1872, and the tramway track was removed in 1873, after the completion of the new Cumberland Basin lock. Chain Quarry was finally filled by 1879. In 1890 Pembroke Road Quarry was identified as a landfill site for the material to be excavated during the construction of the Frome Culvert and this was completed in about 1907 (Nichols, 2005). The boundaries of some of these former quarries can be traced due to some settlement of the infill, and no doubt 9 m of river sediment and assorted rocks will have had a significant effect on the type of soil which has developed on these sites.

Minerals and Mining

There is an area of disturbed ground known as the Dumps between Upper Belgrave Road and Ladies Mile. This is unlike any other feature on the Downs and its origin is unknown. It has been suggested that it was a former lead mining area, but the alignment of the workings are quite different from that of the known lead veins nearby. It has also been suggested that it was a former limestone quarry but it does not have the appearance of any other quarry on the Downs. Other suggestions are that the mineral celestite was worked here, or that the trenches were lead workings which were later enlarged by quarrying to supply limestone (Kellaway and Welch 1993, p. 50).

Several minerals have been found on the Downs. Galena was worked as lead ore, and several veins run north westwards from opposite the Zoo. The remains of some of the "grooves" dug by lead miners as they followed the lines of the mineral veins are still visible. The mineral has been recorded at several other sites on the Downs, including in old workings north and south of the White Tree, in the highly mineralised belt at the northern end of Durdham Down (Kellaway and Welch, 1993). The Romans are commonly thought to have worked lead and there is a reference that

the mineral was dug on the Downs in the Anglo-Saxon Charter of 883. The first clearly documented record is for 1611 when the Lord of the Manor of Henbury granted a licence to dig for lead on Durdham Down. In 1712 another lease was granted to mine lead ore as well as iron, manganese and calamine on the Downs (Micklewright and Frost, 1988).

Iron ore was extracted in Clifton, but there is no definite evidence that it was worked on the Downs. In 1872 an iron mine was opened below Royal York Crescent in Clifton and it produced 3,000 tonnes (3,800 tons) of ore in that year. Two beds of hematite, goethite and limonite were worked in red sandstone and shale (Savage, 1999).

The mineral Calamine (now called Smithsonite) was said to be the “*most important mineral in point of frequency and value that the limestone yields.*” (Bright, 1817, p.200). It was a valuable source of zinc which was amalgamated with copper to form brass in local mills. The mineral was found in veins cutting the limestone, together with calcite, barite and galena. Bright records that: “*The calamine has hitherto been worked in a very imperfect manner: the vein is broken into, when it meets the surface; a rough windlass is placed over the hole, and a bucket is attached to a few fathoms of rope; two or three men work at the vein as long as the ore is found in abundance, or until the water impedes their progress. The mine is then deserted, but the heaps of rubbish at the mouth of the pit are often so rich in ore that considerable sums are paid for the privilege of washing them.*”

Quartz geodes were once extracted from the rocks around Observatory Hill and sold to visitors as “Bristol Diamonds”. Also more prosaically known as Potato Stones, these nodules of quartz are thought to have replaced the mineral anhydrite. The most prized form was a hollow geode with quartz crystals growing in towards the centre. These were very popular with people who came to visit the Hotwells Spa, and could be purchased from shops in the Colonnade. References to Bristol Diamonds go back to 1540 when Camden wrote: *in hills about Bristow be found little stones of divers colours counterfeiting precious stones.* Probably the largest collection of Bristol Diamonds is in the grotto in the garden of Goldney House in Clifton, which was built in the 1740's. The geodes were found in both the Dolomitic Conglomerate and in iron ore veins cutting through the Carboniferous Limestone (Savage, 1999).

Lead veins found on Clifton Down beneath the Triassic Westbury Beds consist of galena, sphalerite and marcasite, with barite and calcite. Elsewhere the veins in the Carboniferous Limestone show two generations of mineralisation. The first consists of hematite and quartz, followed by galena, barite and calcite, which may be deposited in a central infilling of the vein (Kellaway and Welch, 1993, p. 143).

Celestite has been recorded found in the local Triassic rocks, but there is no evidence that it was worked on the Downs. However on the other side of the Gorge, in Abbots Leigh, there were extensive workings for the mineral in the late nineteenth and early twentieth centuries. These were considered to be among the richest worked in the Bristol district, with some boulder sized masses weighing up to half a ton (Kellaway and Welch, 1993, p.134).

Conclusion

The 1861 Downs Act certainly preserved a green open space for the citizens of Bristol, but it also unfortunately led to the infilling of most of the quarries which once provided information about the geology of the area. Sadly the Bone Cave is completely buried but at least many of the fossils excavated from the site have survived in the City Museum and Art Gallery. The two remaining quarries on Observatory Hill very clearly display the dip of the rocks and this is much appreciated by the younger generation as a slide. The road cutting leading to the Suspension Bridge exposes a splendid array of fossils and mineral veins, as well as a rock which probably once filled a cave on the coast of the Downs Island of just over 200 million years ago. Hopefully these special places will be conserved for future generations to appreciate.

References

- Benton, M.J., 2012, Proceedings of the Geologists' Association, 123, pp. 766-778
Bradshaw, R. and Frey, A.E., 1987, Proceedings of the Bristol Naturalists' Society, 47, pp. 45-64
Bright, R., 1817, Transactions of the Geological Society, pp. 193-205
Donovan, D.T. and Kellaway, G.A., 1984, Geology of the Bristol District: the Lower Jurassic Rocks, British Geological Survey, 69 pp.
Foffa, D., 2014, Proceedings of the Geologists' Association. (*in press*)
Greenacre, F., The Downs History Trails No. 1, Durdham Down
Hawkins, A.B., 1987, Proceedings of the Bristol Naturalists' Society, 47, pp. 65-78
Kellaway, G.A. and Welch F.B.A., 1955, The Bulletin of the Geological Survey of Great Britain, 9, pp. 1-21
Kellaway, G.A. and Welch F.B.A. 1993, The Geology of the Bristol District, British Geological Survey, 200 pp.
Latimer, J., 1887, The Annals of Bristol in the Nineteenth Century, W and F Morgan, Bristol, 552 pp.
Micklewright, S.D. and Frost, L.C., 1988, University of Bristol Avon Gorge Project Report No. 10
Moore, C. 1881, Quarterly Journal of the Geological Society of London, 37, pp. 67-82
Nichols, G., 2005, To Keep Open and Unenclosed: The Management of Durdham Down Since 1861, Bristol Branch of the Historical Association, Pamphlet No. 116, 40 pp.
Savage, R.J.G., 1999, Proceedings of the Bristol Naturalists' Society, 59, pp. 65-76
Tawney, E.B., 1875, Proceedings of the Bristol Naturalists' Society, pp. 162-166
Vaughan, A., 1905, Quarterly Journal of the Geological Society of London, 61, pp. 181-307

‘...truly English downland...’

Francis Greenacre.

No other city in Britain has such a large and spectacular open space so close to its centre. The appearance of that landscape has altered radically in the last two hundred years. Today, the pace of change may even be increasing as woodland, copses and scrub become denser and expand still further into the once grazed and open downland. This article looks at some of the visual evidence that helps to document the start of these fundamental changes in the nineteenth and early twentieth centuries.



1. *The Downs from Clifton*, c. 1770, watercolour by John Inigo Richards, private collection

One of the very earliest drawings of the Downs dates from about 1770 and it is by John Inigo Richards, a founder member of the Royal Academy and later principal scene painter at Covent Garden (1). It was first assumed to be a view from Clifton Camp, the Iron Age hill fort on Observatory Hill. In the foreground would be the fort's ramparts, which were grazed and open until the early twentieth century, but which are being revealed again by progressive scrub clearance that began in 2011. Instead, the view point is from near the future site of Litfield Place near the top of Canynge Road and the very broken foreground is evidence of mining, probably in the 16th century. Litfield was a field name that acknowledged earlier lead mining here, of which Richard's drawing is a unique record.

James Russell's most important paper on *The Archaeology of the Parish of Clifton* notes that the Clifton parish register for 1574 records the deaths of two Mendip miners who had been 'stifled with smoake' while digging 'for tynne and lead'.¹ This was near Upper Belgrave Road where, today, scrub is increasingly obscuring the so-called Dumps, the line of gullies and trenches that survive as reminders of medieval mining on the Downs.

Near the centre of the watercolour is the tollgate at the top of the future Bridge Valley Road. Above the house is the cliff face promontory that was soon to be quarried away, as stone quarrying developed apace at the end of the eighteenth century, first within the Avon Gorge, and then, especially in the earlier years of the next century, on the open downland as well. One guidebook to Bristol was already warning in 1793 that 'those sublime wonders of nature,...whose fame has excited thousands of strangers to visit Hotwell and Clifton, and been a means of the inhabitants acquiring great wealth, will be wholly demolished.'²

The extent of the quarrying and the role of the Avon Gorge and the Downs as a pleasure ground for the eighteenth century visitors to the Hotwells spa can be seen in Samuel Hieronymous Grimm's drawings of 1788 and 1789 in Bristol Museum and Art Gallery and in the British Library³. Unlike the essentially winter spa at Bath, the Hotwell was a summer spa and the dramatic surrounding countryside was very much part of the cure. 'For those who love riding there is the finest country in the world; and, even for carriages, nothing can exceed it; the Downs are spacious and open, and we enjoy healthful exercise in a pure air...'⁴ Those words come from a guide book of the 1750s, just a decade after John Wallis had built a wall along the cliff top which we now call Sea Walls. That wall, deliberately built for the safety of the Hotwell visitors on horseback and in carriages, is clearly visible in Samuel's drawing. Although the wall has been repeatedly rebuilt, many of the original eighteenth-century conical capping stones, made of blocks of iridescent slag from Bristol's brass and copper industry, survive.

From the toll house on Richard's picture a road runs across the Downs following the line of today's Ladies Mile. Not a single tree is to be seen on the Downs. Those trees in the foreground on this side of the building are on farmland within the Manor of Clifton rather than on common land. These commons, the open downland of Clifton Down, were for the benefit of the tenants or commoners of the manor. And Clifton

¹ Bristol and Avon Archaeology, 1999, vol.16 p.79

² E Shiercliffe, *The Bristol and Hotwell Guide*, 1793

³ F. Greenacre, *From Bristol to the Sea*, 2005, p47.

⁴ E. Coker, *Observations on the earths, rocks, stones and minerals...about Bristol and on the nature of the Hot Well* 1753

Down adjoined Durdham Down, the commons of the Manor of Henbury, thus forming over 422 acres of grassland. The rights of the manorial tenants to graze their animals, mainly sheep, were still being jealously guarded by the commoners and carefully managed by the respective Lords of the Manor.⁵



2 View from Clifton Down looking towards Leigh Woods with the ruined windmill and Dundry in the distance, c. 1780, watercolour by Nicholas Pocock, Bristol Museum and Art Gallery, K2349

Nicholas Pocock's watercolour (2) of about 1780 looks in the opposite direction and confirms the accuracy of Richard's image, and most especially its treelessness. The ruined windmill and the tilting remnants of a signal mast for shipping, which the artist might well have used in earlier years when he was a ship's captain, add to the bleakness of the scene. On the Leigh Woods side of the gorge the barren cliff face on the south side of Nightingale Valley can be seen above one of the earliest of the growing number of stone quarries that were initially mostly on the Somerset side but which were now developing fast along the Gloucestershire bank.

⁵ By 1799 the Society of Merchant Venturers already appear to have been more concerned about the effects of the theft of turf and soil upon 'persons walking or riding' than upon the commoners' grazing: Patrick McGrath, *The Merchant Venturers of Bristol*, p.191



3. Samuel Jackson. *The Avon Gorge from the edge of Clifton Camp below the Observatory*, c. 1845, watercolour, Victoria & Albert Museum, 338-1872

Samuel Jackson's watercolour (3) in the Victoria and Albert Museum bears a truncated watermark of the 1840s confirming that it is about twenty years later than other views from near the same spot by Jackson and by his friend Francis Danby. Those better-known views of the early 1820s show only a mere peppering of bushes or low scrub along the edge of the gorge, and demonstrate that grazing was already in decline. But in those earlier watercolours there is still no visible evidence of trees⁶. Jackson's V & A watercolour, reveals the extent of 'beautification' that was already in progress well before the Downs Act of 1861. The figures in the foreground are no longer Hotwell visitors but local residents. Benches have been set out and trees planted.

In 1766 the Merchant Venturers, in 'an attempt to preserve the Clifton Down and to prevent nuisances' gladly accepted the offer of Sir William Draper to act as

⁶ F. Greenacre and S. Stoddard, *The Bristol Landscape: the Watercolours of Samuel Jackson*,

1986, pl.35. F. Greenacre, *From Bristol to the Sea*, 2005, pls. 53,63; F.Greenacre, *Francis Danby 1791-1863*, 1988 pls.84,85

Conservator of Clifton Down'.⁷ Sir William had very recently built a mansion, Manilla Hall, which looked out on the south-eastern corner of Clifton Down and he was no doubt tempted to regard the commons as convenient parkland. With the sharp growth of Clifton at the end of the century and especially the laying out of terraces fringing the Clifton end of the Downs in the 1780s and 90s, this proprietorial approach to the Downs and in particular to Clifton Down from the local residents inevitably developed. The pedestrian Promenade was laid out and its avenue was



5. *View across Bridge valley Road to the Promenade and Clifton Observatory with the Clifton Suspension Bridge imagined as completed, c. 1856, colour lithograph, Bristol Museum and Art Gallery (Sol. 243)*

first planted in the early 1820s and it is still much used today. By 1830 there was a smart fence protecting the pedestrians from unruly horses and carriages on the adjoining road.⁸ Bridge Valley Road had been completed in 1822. The ruined windmill began its transformation into the Clifton Observatory in 1828 when the artist, William West, was granted a lease by the Merchant Venturers and in 1836

⁷ McGrath, *op cit*, p.190

⁸ T.L.Rowbotham's 360 degree panorama from the Clifton windmill, 1830, Bristol Museum and Art Gallery, illus. in University of Bristol, Avon Gorge Project, report No 10, S.D.Mickelwright and L.C.Frost, *An outline of the history and historical land use of Clifton and Durdham Downs*, 1988, p.23, pl.9. A subcommittee of the Downs Committee has recently considered sharing the pedestrian promenade with cyclists, a proposal to which I am opposed.

Bristol Zoo Gardens opened in a former meadow adjoining the Downs. We can date the colour lithograph (4), which looks back towards Samuel Jackson's viewpoint, to about 1856 for, on the far left, only the first two of the northernmost of Clifton Down's grand sequence of semi-detached mansions have been built. Today's Mansion House and four other vast semis have yet to link up to the grand houses further up the hill. The lithograph well illustrates a guide book description of 1850: 'In front of these magnificent houses is...a fashionable place for a cool promenade in the summer months, under fine limes and other forest trees opposite Leigh Woods.'⁹ Together with Jackson's watercolour, the two views (3 and 4) suggest that landscape changes in this area of the Downs were a combination of both the action and involvement of an ever-increasing number of local residents as well as the decline of grazing on Clifton Down. Grazing rights went with properties and as development continued the numbers of commoners exercising those rights was reduced. By 1859 only three or four Clifton Down commoners remained. By 1909, when the manager of the Clifton Down Hotel near the bridge complained that 'continual bleating' was disturbing his guests, it would have been sheep belonging to the commoners of the Manor of Henbury that were to blame.¹⁰



5 'Clifton Downs near Promenade, Bristol', postcard, c.1900, collection of Gordon Millward

⁹ John Morgan, *A brief historical sketch of Clifton...*, May 1850

¹⁰ The Bristol Naturalists' Society, Special Issue No i, 1989, *The Avon Gorge*, (reprinted from *The Proceedings of the Bristol Naturalists' Society*, vol.47, 1987) S.D.Mickelwright and L.C.Frost, *Historical land use of the Bristol Downs as common of pasture*, pp.22 and 23

The postcard of about 1900 looking from Fairy Land across Bridge Valley Road towards the Promenade (5) shows Observatory Hill as still surprisingly bare. But the occupants of the mansions overlooking the Promenade have already begun to lose the views that their houses were built to enjoy. Most striking is the evident variety of trees and many of these will have been planted after the Downs Act of 1861. The Downs Committee, made up equally of Bristol City Councillors and Merchant Venturers, created a Planting and Thinning Sub-Committee. It set out to ‘beautify’ the Downs, planting both native and alien species of elm, oak, lime, pine, birch, yew, hawthorn and mountain ash. Holm Oak and Black Austrian Pines may be the ones we now most regret. The postcard also gives evidence of the decline of the number of grazing sheep, for scrub, perhaps mostly of brambles, is already flourishing around some of the smaller trees in the centre.



6. ‘Fairyland’, c.1910, postcard, Bristol Record Office (43207.9.35366)

The advance of scrub is still more obvious in the postcard (6) misleadingly entitled Fairyland. Today, the path that runs from the Promenade to the Portway, named the Mousehole, still exists as a broad muddy track, perhaps largely maintained by intrepid joggers. But the glades have almost totally disappeared or are filled with brambles. So, too, has most of the scrub within the now mature secondary woodland, much of it impenetrable. Inevitably, there are no glimpses of the bridge or of Alpenfels, whose Swiss roof can be seen in the postcard. At the top, the fringes of the woodland continue to make annual advances on the grassland that divide it from

the Promenade. Half-way along the Promenade the wood now actually encroaches upon the path and it is shading out the young beech-tree replacements in the avenue, whose especially spectacular autumn colours are regularly featured in the national press.

But the woodland edge along the Promenade is no longer an impenetrable screen. Early this year one of the most dramatic of viewpoints was partially opened up. Once again we can sit on the carved stone bench-slab that may well be the one depicted in the middle distance of Samuel Jackson's V & A watercolour (3). You still cannot look along the Avon Gorge, but you can now look out across the river to Leigh Woods, maybe enjoying an elusive tree-creeper winding its way up an ash tree below you.

More dramatic still was the felling of the trees in January 2012 that totally obscured the view up the Avon Gorge to Wales from the ramparts of the hill fort on Observatory Hill. For a decade previously Mandy Leivers's information panel near the best of all viewpoints had been illustrated with a watercolour of the very same view of the 1820s by Samuel Jackson.¹¹ With the image before them, the public could see what they were missing and the initiative was welcomed.

Certainly treeless until the 1820s, Fairyland, like much of the Downs, may well have had patches of gorse which was regularly harvested and for which the Lords of the Manor were paid.¹² The gorse in the foreground of the postcard of Fairyland of about 1910 (7) may well be a relic of the furze, that is gorse, bracken or heather, which was an important source of domestic fuel and animal bedding in earlier times. In 1785 the Merchant Venturers were negotiating with the Bristol Wire Company which had 'offered £4 a year for the liberty to cut Gorse and Furze in the Manor of Clifton'.¹³ This was for industrial use but the gorse was soon being celebrated for its 'perpetual bloom' and 'fragrance' by a guidebook writer in 1806.¹⁴ In 1904 six hundred gorse plants were acquired for the Gully and in 1935 120 'double gorse' plants were acquired.¹⁵ Almost all have long since been shaded out.

¹¹ F.Greenacre and S.Stoddard op cit., pl. 35

¹² (Elizabeth Ralph) *The Downs, Clifton and Durdham Downs*, Bristol, c. 1973, p.10

¹³ S.D.Micklewright and L.C.Frost, op cit., p.36

¹⁴ R.W.Manby, *History and Beauties of Clifton ...* 1806. cited by Mickelwright and Frost, op cit. p.37

¹⁵ Mickelwright and Frost, op cit. p.38; G.Nichols, op cit., p.9



Postcard c 1910

As well as documenting the survival of gorse, the postcard of Fairyland illustrates the unhappy consequences of the Downs Ranger's understandable *laissez-faire* approach to this part of the Downs. In 1872 he reported to the Planning and Thinning Sub-Committee in 1872: 'The Gorge between Bridge Valley Road and Durdham Down is so filled with forest trees and shrubs and wild Rose smothered with ivy and matted with Clematis, green in summer and hoary in winter that it cannot be surpassed and must be left to flourish in its loveliness.'¹⁶ As we see here it was a policy that did not work. With fewer and fewer sheep the dense walls of scrub advanced on the greensward. In 1912 the Downs Ranger recognised that thinning and the removal of overgrowth was becoming necessary and took action – we know not where. But the Downs Committee crumpled before the fierce opposition of The Bristol Naturalists' Society and of J.W.White, himself, who complained bitterly that 'the glorious beauty of clematis, brambles and wild roses trailing amid the trees was entirely swept away.' In 1987 Drs Micklewright and Frost roundly chastised the Bristol Naturalists' Society and J.W.White for their successful opposition seventy-five years earlier to the committee's early attempts to control ever-increasing scrub

¹⁶ Micklewright and Frost, op cit., p.38

– both were ‘ignorant of the principles of ecology, then a science in its infancy.’¹⁷ Today the enticing meadow that the postcard depicts is at most a third of the size recorded here and the wild roses and trailing clematis may be inadequate compensation.

In the photograph of about 1910 (8) looking across Stoke Road over fifty sheep can be seen. Sheep had helped to create the essential characteristics of the open limestone downland, but now, after surviving biplanes, golf and cricket balls, agricultural fairs and military manoeuvres, their numbers were declining sharply and in 1925, fifteen years after the approximate date of this postcard, grazing ceased altogether. In one vital respect, footballers have replaced them.



8. *Sheep sheltering off Stoke Road, Ladies Mile in the distance*, c.1910, postcard by Fred Little, Bristol Record Office (43207.9.35.17)

When Thomas Proctor unveiled the drinking fountain at the top of Bridge Valley Road in 1872 he said that it was for the “thousands who avail themselves of the downs on the Sunday afternoon and evening . . . but to meet any extra demand, my man takes out a number of half-pint mugs.” Proctor was living in what is today the Mansion House just a hundred yards away and his patrician approach was already being threatened by complaints that the Downs were only easily accessible to the rich who lived nearby. But in the same decade the horse-drawn tram arrived at the bottom of Blackboy Hill and in the 1880s football was first played regularly on the

¹⁷ Do IT: p.24 and 40

Downs. In 1905, soon after the electric tram had reached the Downs, the Downs League was formed. It now has over fifty clubs in four leagues - an unrivalled statistic, a colourful sight on Wednesday and Saturday afternoons in the winter and the best possible defence of the surviving downland.

In the middle distance is the avenue of Huntingdon elms on Ladies Mile, probably those planted in 1872 on behalf of the Downs Committee.¹⁸ Dutch Elm disease was to lead their replacement in 1980 by the young lime trees we see today. In the mid-eighteenth century the three principle roads or tracks across the Downs were Westbury Road, Stoke Road and the track running north-west from near the start of Ladies Mile that is today an avenue of trees only. Each route had an avenue of trees, planted, not for ornamental purposes, but principally so that the lower branches could be cut for firewood.¹⁹ Dating from 1828 is T.L.Rowbotham's 360 degree panorama of the Downs from the ruined windmill, which shows a short line of trees beside the Turnpike Road, at the start of the future Ladies Mile, and it is possibly the earliest visual evidence of trees within the heart of the Downs.²⁰ The editor of this journal, Richard Bland, has very recently drawn attention to the oldest trees surviving on the Downs.²¹ Almost all are on the fringes of the Downs. Westfield Park's Common Limes form an avenue along Clay Pit Walk and their girth suggests a planting of around 1775, close to the time when the residents of Redland complained to the Lords of the Manor about 'Horse-racing, Boxing, etc., and the very great evils resulting therefrom'.²² As in Clifton, the initiative almost certainly came from local house-owners who may have sort relief from the unsightly and boggy claypits that were not to be filled in until the 1860s. Richard Bland also wonders if the line of Beech trees parallel to Savile Road could relate to the Clifton Cricket Club's move there from near Sea Walls in the 1840s.²³ W.G.Grace might well have retreated to their shade when he first played for the club in 1863 aged fifteen and scored a pair.²⁴

¹⁸ G.Nichols, *'To keep open and unenclosed': the management of Durdham Down since 1861*, 2005, p.9

¹⁹ Mickelwright and Frost, op cit. p.12, pl.5, Hammersley's *Survey of the Manor of Clifton*, 1746

²⁰ Op cit., p.23, pl. 9

²¹ R. Bland, *The veteran trees of the Downs*, newsletter of the Friends of the Downs and Avon Gorge, Spring 2014, issue pp. 14, p.13 and 14

²² (E.Ralph) op cit., p.8

²³ G.Nichols, op cit., p.9 refers to the 'horse chestnuts parallel to Savile Road originally [planted] to demarcate a boundary between horse-riders and the Clifton Cricket Club'.

²⁴ *Sides and Squares, Clifton Cricket Club 1819-1983*, J.F.Burrell, editor, 1983

Just beyond the two mature trees on the right of the postcard (8) was the most massive of several substantial early nineteenth century stone quarries on the Downs. These quarries were filled in the 1860s and 70s with the aid of a hydraulic railway running from Hotwells and diagonally up the side the gorge from the Great Quarry. Rich alluvial mud from improvements to Cumberland Basin and near the site of the old Hotwells spa was used and might have tempted some ambitious planting. However, this only occurred at the quarry now marked by the so-called Seven Sisters - alien Austrian pines planted in October 1872.²⁵ Three remain today. Instead, the planting of single trees by the Downs Committee within the open spaces of the Downs was impressively limited. Hawthorn, already a feature of the Downs, was extensively planted and many postcards from the very early 1900s celebrate the May blossom – evidently a major feature of Bristol's year. Perhaps to build on this success, double crimson hawthorns were acquired for the slopes above the top of Pembroke Road in 1929 and in 1935 twenty-four laburnums and twelve almonds were purchased.²⁶

We can date the postcard view overlooking the Gully (9) to 1913 for in the distance on the left are the white palisades that surrounded the vast Royal Agricultural Fair which was to be visited by King George V. Beyond the benches are the remains of Wallis' Wall erected in the 1740s to prevent the carriages of Hotwell visitors from tumbling over the edge. In the middle distance is the rocky promontory that remains mostly largely treeless today and where the rare Honewort can still be found. In the postcard the views from this side of the Gully are open, but there had already been a complaint in 1912 that the views from the opposite side were being obscured by tree growth. Today, only the concrete bases of the seats remain before an impenetrable wall of trees and scrub and, except from the promontory itself, there is barely a glimpse of the Avon Gorge from Sea Walls to the Peregrine Watch Point.

²⁵ G.Nichols, *op cit.*, p.9

²⁶ *Op cit.*, p.9



9. *Overlooking the Gully*, 1913, postcard, Bristol Record Office (43207.37.10.2)

It is in the Gully that the most extensive conservation scrub-clearance has taken place in recent years. When S.D.Mickelwright made his detailed ‘conservation management recommendations’ in 1983 work had already begun taking due advantage of Dr C.M.Lovatt’s vital Ph.D. thesis on the rare plants of the Avon Gorge presented to the University of Bristol in 1982.²⁷ The introduction of six Kashmiri goats from the Great Orme in June 2011 has successfully controlled re-growth, enabling colonies of rare wild flowers and grasses to become more securely re-established. Despite the necessity of erecting what has proved to be surprisingly discrete fencing, one additional benefit of the project has been the opening up of this part of the Downs to the general public, which had long felt excluded by the area’s reputation for anti-social behaviour.

So, there has been some considerable conservation success within the Gully, annual works on the cliff faces supporting the Avon Gorge’s rarest flora, and vital clearances on some of the slopes and fringes of the Downs, notably within the wooded areas between the gorge and Circular Road, and within the Hill Fort and on

²⁷ University of Bristol, Avon Gorge Project, report No 4, S.D.Mickelwright, A survey of historical land use, present vegetation types and localities of rare and uncommon plants on the Clifton side of the Avon Gorge with conservation management recommendations, 1985

Zoo Banks. And views have begun to be opened up. There has been crucial financial support and guidance from English Nature. On the more open plateau of the Downs, however, it is harder to report progress.

As Micklewright and Frost lamented in 1988 ‘The pleasing and unique appearance of a piece of truly English downland has been seriously compromised...’²⁸ The scrub, copses, thickets – call them what you will – are still advancing. This constant expansion, this continuing loss of downland is taken seriously and Becky Coffin, Bristol City Council’s Nature Conservation Officer and her sub-committee of the Downs Committee is initiating a detailed survey of the copses on the Downs. Hannah E. Palmer’s charming watercolour of about 1930 (10) illustrates the brief interlude between the end of grazing and the introduction of mechanised mowing on the Downs. The view looks south from near Ladies Mile and Leigh Woods can be seen in the far distance.



10 *Haymaking on the Downs*, c.1930, watercolour by Hannah E. Palmer, Bristol Museum and Art Gallery (K5498)

²⁸ Micklewright and Frost, *op cit.* p.11

There is a dominant ash tree in the centre and several hawthorns, and beyond are the young trees on the old replanted avenue marking the line of the old road from Clifton to Stoke Bishop abandoned after 1750. With the end of grazing in 1925, the sheep-browsed level bottoms of the trees evidently survived for a few years and there are, as yet, no clumps or copses forming around the hawthorns in Miss Palmer's picture. The scythe, rake and hay cart has briefly succeeded the sheep, but by 1932 Gardiners were demonstrating a horse-drawn gang mower to the Downs Ranger and in the following year a motor mower was first acquired.²⁹

Repeated mechanised mowing continued for half a century and it was not until 1988 that the Downs Ranger left a small area to be mown just once a year in late summer. Bee orchids, harebells, ox-eye daisies, dropwort, knapweed and other flowers appeared. Grasshoppers, bush-crickets, bees, butterflies and other insects prospered. The uncut-meadow areas have been progressively extended since then to marvellous effect - most especially that of the flowering grasses when seen against low evening sunlight in June and July.

However, as soon as a mower was unable to penetrate the self-sown seedlings around a tree, a dense ivy-laden clump could form and the autumn winds would often blow it over. A single tree became an ever-expanding copse, rich in wildlife and a vital food source, but the hawthorn, so often at its core and the favourite of the winter visitors such as the Fieldfare and Redwing, is lost. And the downland's greensward is diminished.

The Downs Ranger team has battled for decades with this problem and with an ever-decreasing number of staff. The Friends of the Downs and Avon Gorge, founded in 2008 with the bold encouragement of Bristol City Council, have already given vital help with litter picking, goat monitoring and the building of steeple-chase fences or dead hedges that gently guide runners away from the orchids. Last year the Friends began an 'Adopt a Hawthorn' scheme, involving the selection of a small number of relatively independent hawthorn trees. Members then remove ivy, sycamore seedlings and so forth in order to preserve one of the oldest features of the Downs and to prevent the formation of yet another chaotic clump. This year the May blossom was spectacular and it no longer seemed like a final flourish.

²⁹ G.Nichols, *op cit.*, p.15

The scheme is generously managed by the editor of this journal, Richard Bland, who has written: 'Every year the scrub expands, and clumps start to link arms, and the gang mowers have less and less grass to cut. This is a natural process, and the time and money to check it no longer exists.'³⁰ I end as I began - no other city in Britain has such a large and spectacular open space so close to its centre; and much of it is an outstanding SSSI and a vital and very well-used recreational amenity also. We must prove our editor wrong.



Haethorn in bloom R Bland

³⁰ Richard Bland, *Hawthorns on the Downs*, BS8, March 2013, No 49, p.35

The work of the goats and a history of the Avon Gorge and Downs Wildlife Project

Chris Westcott (Natural England)

Introduction

The Avon Gorge is one of the most important botanical sites in the UK and is famous for its rare plants, geology and its iconic landscape setting. It is nationally recognised as a Site of Special Scientific Interest (SSSI) and internationally designated as a Special Area of Conservation (SAC).

The Gorge is home to many rare and threatened plants including the Bristol Onion or Round-headed Leek (*Allium sphaerocephalon*) and Bristol Rock-cress (*Arabis scabra*), which are both Nationally Rare, found growing here and nowhere else in the United Kingdom. There are over 30 additional rarities including the small succulent Rock Stonecrop (*Sedum forsterianum*) and the tall and elegant Spiked Speedwell (*Veronica spicata*) which are both Nationally Scarce. Most of the rare plants are associated with the open calcareous limestone grassland communities, which grow on the rocky outcrops and steep grassy slopes.

The Avon Gorge is also home to a unique diversity of rare whitebeam trees, such as the Bristol (*Sorbus bristoliensis*) and Wilmott's whitebeams (*Sorbus wilmottiana*) that grow here, in the Avon Gorge, and nowhere else in the world. Many of the rare whitebeams have arisen relatively recently by a process involving hybridisation and are adapted to living on the open thin soils of the Gorge.

Along with the rare trees and plants, the Gorge is a very important site for scarce invertebrates. These include the Silky Wave moth (*Idaea dilutaria*), which is only found at two other places in the UK – the Great Orme in North Wales and along the Gower coast. Lesser and Greater Horseshoe bats can be found roosting in the caves and the site supports a wide range of breeding birds including the Peregrine Falcon (*Falco peregrinus*) and Raven (*Corvus corax*).

The physical geology of the Gorge is also a very significant feature and one that has been studied since the early 19th Century. The rock formations show the complete local succession of Carboniferous Limestone and the massive bedding planes can be seen from various viewpoints around the Gorge. This underlying limestone rock is responsible for the development of carboniferous limestone soils, upon which the rare plants, trees and habitats of the Gorge depend.

Establishing the Avon Gorge and Downs Wildlife Project

The grassland on the Bristol side of the Gorge was once grazed by sheep, which kept it open and free of trees and scrub. When grazing started to decline at the beginning of the last century and finally ceased in 1924, the steep areas became overgrown and woodland established, reducing the extent of calcareous grassland and the rare plants this habitat supports. The pressure on these rare plants and habitats was increased further by what was known as 'beautification of the Downs', which from 1871 onwards saw the planting and introduction (both purposeful and accidental) of many highly competitive non-native trees, such as Holm Oak (*Quercus ilex*) and Austrian or Black Pines (*Pinus nigra*), shrubs including cotoneasters such as Wall Cotoneaster (*Cotoneaster horizontalis*) and other herbaceous plants, including Everlasting Pea (*Lathyrus latifolius*).

Over time many of the areas of species rich calcareous grassland almost disappeared along with several of the Gorge's rare plants. The SSSI condition was regarded as 'Unfavourable Declining' by English Nature (now Natural England) in the late 1990's and the need for a coordinated and programmed management response was clear. This led to the formation of the Avon Gorge and Downs Wildlife Project in October 1999.

The aim of the Project was, and still is, to protect the outstanding wildlife interest of the Avon Gorge and Downs and to raise awareness and understanding about the importance of this site for people and wildlife.

The Project is a partnership of Bristol City Council, Bristol Zoo Gardens, Natural England, Society of Merchant Venturers, University of Bristol and the Downs Committee. Representatives from these organisations sit on a steering group that guides the work of the Project. The National Trust are also part of the Project steering group because they own and manage Leigh Woods National Nature Reserve (NNR), which is within the wider Avon Gorge SSSI / SAC boundary.

Over the last 15 years the Project has been working to produce management plans, coordinate a highly successful programme of wildlife surveying and monitoring, complete habitat management conservation works, and provided further opportunities for the general public to discover more about, and enjoy the wildlife and the landscape of the Avon Gorge, Leigh Woods and the Downs.

The Gully goat grazing project

One particular area of significance for species rich calcareous grassland and rare plants is a hidden valley, just off Circular Road, on the Bristol side of the Gorge known as The Gully.

Over a hundred years or so this once large area of grassland was reduced to a few small fragments with various rare plant species still clinging on but at risk of completely disappearing. The area became dominated by scrub and secondary Ash (*Fraxinus excelsior*) woodland with a large proportion of non-native species such as cotoneasters, Holm Oak and planted Black Pines.

From 1999 onwards, with funding support from Natural England, Bristol City Council and the Downs Committee, the Avon Gorge and Downs Wildlife Project co-ordinated the clearance of trees and scrub to open up and link the small pockets of grassland that remained. The grassland habitats started to respond but the amount of scrub re-growth was a real management problem, costing a large amount of money annually to control mechanically. The Project needed to look for a more sustainable and natural solution to help manage the volume of scrub regrowth and in partnership with the Grazing Animals Project (GAP) came to the conclusion that the introduction of goats would be the most appropriate option.

Goats were chosen because they are known in certain circumstances to be a useful conservation tool. They are really agile and well suited to the steep and uneven terrain and they make light work of travelling up and down slopes. They are very hardy and thrive in extreme conditions. They also have a simple digestive system which does not digest cellulose very well, so mainly choose to browse woody plants such as Bramble (*Rubus fruticosus*), Common Ivy (*Hedera helix*) and Ash seedlings rather than graze grasses and flowers.

After much exploration it was decided that the most suitable option for obtaining goats for the Gorge was from an existing conservation project run by Conwy County Council on the Great Orme, in North Wales. So in June 2011 staff from Natural England and Bristol City Council went to the Great Orme and helped Conwy Council staff and volunteers with the annual round up of their feral Kashmir goats.

There have been goats on the Great Orme for over 100 years and they are considered 'feral'. They were originally introduced in the early 1900s when Lord Mostyn gave them to Queen Victoria. The population on the Orme is a breeding herd and has to be controlled due to the limited availability of suitable forage and the size of the area of land they inhabit.

Following advice from GAP it was decided that a group of 6 goats would be the optimum number of animals for managing The Gully area. A single sex group of billy goats was chosen because they are larger animals than nannies and more able to stand up for themselves should they be confronted by a dog - quite likely in this highly public area.

In order to ensure that the goats remain within The Gully area it was fenced during the winter of 2010 and lots of access points were included. Along with perimeter fencing the known rare whitebeam trees were also guarded to ensure that they were protected from any browsing pressure. A small goat exclusion zone was also created within the enclosure to be used as a control area.

The story so far....

The six billy goats were introduced to The Gully in June 2011 and although it has only been a relatively short period of time there is an obvious reduction in the amount of low growing scrub throughout the area.

It is clear that goats are targeting the plants like Bramble, Ash, Hazel (*Corylus avellana*) and Common Ivy. They are however also stripping bark from Common Whitebeam (*Sorbus aria*) trees which grow within the area. All the rare species have been successfully protected from any browsing pressure and additional measures have been put in place to protect a small, selected number of Common Whitebeams.

There is good evidence to suggest that the whitebeam trees in the Gorge are in a state of contemporary evolution, which is resulting in many closely related species and hybrids occurring within this discrete geographical area. Some of the different species are Nationally Rare or Scarce, but Common Whitebeam, in other instances presumed to be of low conservation concern, is an important element of the evolutionary processes occurring here. The proper conservation of the Gorge's whitebeams should aim to encompass sufficient space to allow the evolutionary process to continue. It is worth noting that the overall objective for the area is to balance the restoration of nationally important calcareous grassland habitats and rare plant species along with the management of the site for rare whitebeams. The key sites for the rare species of whitebeam are mainly elsewhere on the Gorge, such as on the Leigh Woods side, with far greater numbers there than are found within The Gully.

The goats themselves seem to be thriving and are much larger and thicker set than when they were first introduced. They have been very well received by the general public and are a popular attraction for visiting people to try and spot. A goat viewing area has been created near the Seawalls end of The Gully and two interpretation panels have been installed.

The Avon Gorge and Downs Wildlife Project run regular 'Meet the Goatkeeper' walks to enable the public to find out about the reasoning behind the introduction of the goats. The goats are also a feature on all of the guided tours and talks that are given to community groups. To date over 800 children have been taught about the goats in the Natural England funded 'Hairy Conservationists' school and play-scheme educational sessions. The goats have also been the subject of a BBC Countryfile programme and a film has been made about them which debuted at the Bristol Festival of Nature.

The goats are being well looked after and are checked on a daily basis by Bristol City Council rangers and volunteers from the Friends of the Downs and Avon Gorge do a secondary check as well. Veterinary care is being provided by Bristol Zoo Gardens.

Monitoring the changes

During the summer last year Natural England began a programme of monitoring to assess the habitat change within The Gully. The initial results from which show that certain positive calcareous grassland indicator species, such as Common Rockrose (*Galium verum*), Glaucous Sedge (*Carex flacca*) and Ploughman's Spikenard (*Inula conyza*) are occurring in many more locations on both the northern and southern side. Species such as Dwarf Sedge (*Carex humilis*) which is Nationally Scarce, was also more frequently recorded throughout the area and a new population of Bristol Rock-cress was noted on the south side. Many of the areas still have native scrub species present but these are also populated by more ruderal and woodland edge species like Hawkweed Oxtongue (*Picris hieracioides*), Wood Sage (*Teucrium scorodonia*), Hemp Agrimony (*Eupatorium cannabinum*) and Wood False-brome (*Brachypodium sylvaticum*). Invertebrates which favour herb rich grasslands like the Small Blue (*Cupido minimus*), Chalkhill Blue (*Polyommatus coridon*) (which have both returned to the Gorge in recent years) and many other species of butterflies are also being recorded in good numbers, so the move to a more grassland dominated habitat will greatly benefit them. The numbers of Silky Wave moths have also been on the increase within The Gully and continued monitoring by Bristol Zoo will help to record the population response to the conservation works.

Conclusion

Clearly the goat project is in the early days and there is a lot more conservation work and further close monitoring required over the coming years. The early indications are that the habitat is returning to a more grassland dominated structure, as it was over 100 years ago, which is helping to achieve the objectives of the management plans and importantly improve the overall condition of the SSSI and SAC.

The Avon Gorge: Ravens and Peregrines

Ed Drewitt

Thirty years ago the possibility of seeing both Ravens and Peregrines frequently over the Avon Gorge, and indeed across most parts of Bristol, would have been unheard. And yet three decades later this is indeed the situation with both species annually breeding in the Avon Gorge and at other sites across Bristol and the surrounding areas. Both species have also become urban, with Peregrines in particular taking up residence on churches, office blocks and other buildings. Ravens meanwhile are a little more shy but will venture in to the city during the winter keeping to the tops of buildings while during the breeding season they will often make feeding flights over residential areas.

Both the Peregrine and the Ravens are species that we associate with very similar habitat – quarries, gorges, open country and the coastline. And it is unusual to have one without the other in rocky, quarry-type habitats. The two very much put up with each other and while Peregrines will sometimes kill Ravens and Ravens will occasionally take Peregrine eggs or chicks, they generally live side by side, helping to protect their territories from predators.

The Peregrine

In the Avon Gorge Peregrines have been using the area as a regular breeding site since the 1990s. And historically they have used the gorge for hundreds of years – there are even records of Queen Elizabeth I having a falconer who climbed to the nest to take the chicks and use them as part of the royal falconry collection!

In more recent times the Peregrine has returned after an absence perpetuated by deliberate shooting by the Ministry of Air Defence during the Second World War, illegal persecution, egg collecting, and the effects of chemical pesticides used in the countryside during the 1950s and 1960s. The latter cause is the most likely reason the Peregrines in the gorge disappeared for a long period in the second half of the 20th Century. In the early 1900s they were seen on and off but not regularly. Chemicals, in particular DDT and its derivatives, were ingested by pigeons and other seed-eating birds which in turn were eaten by Peregrines. The chemicals were deposited in the fatty tissues of both Peregrines and other raptors, causing dangerously high levels of toxins and the laying of eggs with very thin eggshells that broke under the weight of the incubating adults.

Once the decline in Peregrines across the UK (and other parts of the world) was understood DDT was banned and in the later 1970s and early 1980s Peregrines were free of the chemical and began laying more viable eggs. Since then their numbers have risen exponentially, slowly rising during the 1980s, before increasing more dramatically during the 1990s and 2000s. In some parts of Europe local populations have grown by 10 – 15% per year.

Since 1946 Peregrines have been spotted in the Bristol region every year, and between then and 1975 there were between one and eleven records annually. After 1976 things changed dramatically and Peregrines were being seen more and more frequently until 1985 when a pair was recorded breeding in Avon. This continued for two years and in 1987 three pairs of Peregrines attempted to breed, including a pair in the Avon Gorge which raised a single chick. Since 1990 the Peregrines have reared chicks annually apart from 1993 and 2000. In the early days Peregrines were still particularly vulnerable to persecution and egg collecting. Indeed, in 1990 two of the four chicks were clubbed to death and the Bristol Ornithological Club set up a 24-hour watch to ensure the chicks in future years were not going to come to any harm. Michael and Alix Lord, Mike and Ruth Glover, and more recently Charles Stapleton have coordinated teams of volunteers to man the watch and observe the Peregrines' behaviour. The Peregrine Watch, as it became known, still continues today though in a lesser form. The threat to Peregrines in the UK is still there, but with lots of people watching them and lots of recreational activity on the Downs and in the Gorge, the watch has turned into a more public engagement event.

Up to the summer of 2014 66 Peregrines chicks have fledged from the Avon Gorge since 1987. Of particular interest in 2008, 2010, and 2011, the Peregrines successfully reared five chicks to fledging. Peregrines normally raise between one and four chicks, and five chicks is much less common though it has been recorded more recently in Sutton, Wrexham and at a site in Hampshire. The Peregrines tend to nest on the Clifton Down side of the Avon Gorge, though in the earlier years they did also use sites on the Leigh Woods side.

As Peregrines have become widespread across Avon and former nesting sites are occupied, new breeding pairs are looking for novel breeding ledges that perhaps have never been used before. There are at least 20 pairs in the Avon region and in the recent BTO's winter and summer atlas surveys (2007 – 2011) they were seen in a quarter of the 400 tetrads in the region.

Most nests in west Bristol and east North Somerset are two miles apart, though in recent years we have seen this distance decrease. In 2013, an adult male and a first-year female Peregrine began to nest by the Clifton Suspension Bridge, only a mile from the usual breeding pair. The two eggs were laid late and incubation continued into mid-May. The female abandoned the nest leaving the male to continue incubating the eggs - although he was on the eggs as often as he was off them. Eventually they didn't hatch and under a schedule 1 licence the eggs were removed and sent to the Centre for Hydrology and Ecology for analysis. In 2014 the breeding pair at the usual nest site in the Avon Gorge reared a single chick and a third grown bird, a juvenile from 2013, was often in residence flying around with the adults. It was probably a young bird from the previous year. As Peregrines have increased so too have notable behaviours – in particular the presence of a third bird, usually one reared by the parents the year before, helping at the nest with incubation and feeding of chicks.

Ringling

In 2009 the first Peregrine chick in the Avon Gorge was ringed by myself with help from climbers from the British Mountaineering Council. Five chicks were then ringed in 2010 and filmed by BBC Springwatch, followed by five in 2011, three in 2012, and one in 2014. Ringing was unable to take place in 2013 due to logistics. Of those colour-ringed with blue rings and black letters one chick, colour-ringed BT, was ringed in May 2010 and spotted in the Malvern Hills 70 miles away the following April. Sadly he was then found dead below power lines in October 2011 near Kidderminster. Another fledged chick was found hungry and grounded at Stanton Drew 11 miles from the gorge near Bath and was returned by Colin Morris back to the Avon Gorge a few days later. Another young male bird AG ringed as a fledged grounded bird in June 2008 and released by the RSPCA was spotted a few years later in 2010 at Blagdon Lake with a mate.

While Peregrines continue to breed well in the Avon Gorge and across the Bristol region they are still a vulnerable bird and a species that we cannot be complacent about. With increased observations, vigilance and the use of web cameras on urban Peregrines our understanding of this once almost extinct species in the UK is helping discover more about its habits, lifestyle and lifecycle. The Peregrines in the Avon Gorge are hopefully here to remain with individuals changing throughout the years. Males and females will have different partners during their lifetime and also move to different nesting sites, so over the past 25 years quite a number of individual Peregrines have probably been using the same nest site in different.

The Raven

Ravens are an equally successful story and up to 20 years ago were very much associated with rocky Welsh crags and remote Scottish Islands. Pushed back to the very west and north of the UK on higher ground, Ravens, alongside many other corvids and raptors were heavily persecuted by gamekeepers and those remaining lived in remote areas. With fewer gamekeepers post-Second World War, greater protection of all wild birds, and an increase in sheep farming, road kill and other factors that generate carrion, Ravens have become very widespread in the West and most quarries and other likely haunts usually have a pair or a family group of Ravens present. Their distinctive 'deep, resonating 'cronks' and croaks' are easy to distinguish alongside their large size, long, tapering wings, and diamond-shaped tail. Despite this they are still only spreading into eastern parts of the UK but are not that far behind the likes of Buzzards and Peregrines which have colonised the east in recent years. They first start appearing in the Avon Bird Report from 1966 with up to 70 bird day sightings in 1970. But in the early 1980s there was a steep drop off between 1980 and 1986. From 1987 there was a gradual increase in the number of days Ravens were being spotted each year and by 2004 the equivalent of 750 bird days were recorded in that single year. In 2006 they were first sighted during the Breeding Bird Survey and recorded in 4% of squares surveyed in the Avon region. This has steadily increased to around 18% - with almost a quarter of squares recording Ravens. There are thought to be at least 100 breeding pairs in Avon.

In the Avon Gorge Ravens have been nesting on the Leigh Woods side since 1993. They have habitually used a nest directly opposite the Peregrine Watch point. However, in 2013 a new nest site was used further south in an adjacent quarry with a large overhang. In the same year another pair nested close to Sea Walls. In 2014 a nest was also confirmed in a pine tree by the Water Tower on Durdham Downs by Robin Prytherch alongside at least one nest in the Avon Gorge.

Ringling took place for the first time by myself on the Leigh Woods side of the gorge in 2010 when two chicks were raised. Three chicks were subsequently ringed in 2011. Their large stick nests are lined with soft hair was dogs and deer and form a warm, snug layer for the chicks which will be naked during cold weather in March and April.

Ravens often make a number of nests throughout their territory and sometimes nests that are thought to be occupied end up being still empty during April and May. Those that do nest will have up to five chicks and family groups can be seen flying around over the city centre of Bristol. While others will scavenge along the saltmarsh and tideline of the River Avon from the Cumberland Basin down towards Sea Mills and Shirehampton. While Ravens don't nest in the city centre itself there are many Peregrines nesting across the city from Blaise Woods to the M5 Bridge, and Filton Airfield to quarries on the edge of the Gordano Valley. Like the Peregrine they are spreading quickly and are definitely a bird to look and listen for with confidence. And while Ravens are usually very cautious, shy, birds one or two are becoming more resilient and almost tame. Particularly on Durdham Down one or two Ravens have been spotted foraging while runners and dog walkers stride past within metres of them. And they seem to rule the roost – as they fly in to a group of crows and gull everything makes way for them rather like the biggest and tallest vultures coming in to a kill in Africa. While Ravens are known to predate the eggs of Peregrines, their impact is unknown and generally both appear to nest side by side without obvious negative side effects and successfully rear chicks to fledging.

Over the next decade Ravens are likely to continue to increase in density and become more widespread, with young birds moving east to populate counties that currently have few of these very clever and vocal birds. Overall, the picture is looking very positive for both Peregrines and Ravens in the Avon Gorge. With second pairs of birds also attempting to breed within a mile of the more established nests, the likelihood of spotting and observing both species both regularly is high.



Lichens, D Hill

Lichens on the Downs

David Hill

Lichens are a specialist group and apparently constitute a small component of the ecosystem. But they are primary producers which are food for numerous invertebrates, e.g. molluscs and things with legs, themselves food for other wildlife. There is considerable diversity amongst lichens and the different species each have their own mechanisms for protecting themselves from being eaten away totally by different herbivores and hence not surviving. Thus we can see that lichens fit in to the ecosystem and have an essential role in supporting the diversity of nature.

Lichens are fungi which have become adapted to eliciting and utilising sugars provided by microscopic algae housed in the lichen structure rather than decaying dead or parasitizing living vegetation. In this sense they are similar to mycorrhizas which living off sugars provided by living roots of plants. Lichens are mainly ascomycetes (“cup fungi”) and mycorrhizas are mainly basidiomycetes (toadstools etc). The intricacies of these two groups of symbiotic fungi are biologically fascinating but there is not space to delve in to that here.

The diversity of lichens on the Downs in such an urban context may be unexpected as lichens are known to be very sensitive to pollution but since the levels of sulphur dioxide in the air has been so much reduced since the 1970s, lichens have been reinvading cities where they had previously been absent. Lichens are not only killed by low levels of sulphur dioxide but affected by fluoride, heavy metals and pollution by air born nitrogen compounds. The latter is very pertinent nowadays as farms release huge quantities of ammonia into the air (mainly from slurry as well as poultry and pig units) and vehicles spew out masses of nitrogen oxides (The NO_x map of Britain is the motorway map). The effect of all this nitrogen pollution (deposition at the magnitude of agricultural fertiliser application) has been to modify the lichen flora of lowland Britain with vast abundance of the yellow wall lichen *Xanthoria parietina*. The orange or yellow lichen abounds on tree, roofs, walls etc in town and countryside alike.

The Downs lichens represent a re-colonisation of the area by nitrogen loving lichens or at least lichens tolerant of high levels of nitrogen. The lichens on the Downs have been surveyed at various times – I have records from 1987, 2009 and 2014 amounting to about 120 species. The Downs offers various lichen habitats and substrates. The trees are mainly quite young specimens unlike those in Ashton Court with 68 recorded species and the limestone along the top of the Avon Gorge with 55 species. I visited the limestone on 18 March this year and found *Polyblastia albida* – not a very rare species but I have not found a previous record for it in

Gloucestershire – this was growing on limestone on the top of the Gorge. It is here that we find natural outcropping limestone rather than the quarried surfaces below by the Portway where the lichen flora is very poor as usual for recent rock exposures. It takes 100s of years for a diverse lichen flora to develop.

The trees offered an interesting opportunity to explore the lichen floras of different tree species. Normally when we see horse chestnut trees, they are in urban settings and lichenologists tend to shun them as being of no lichenological interest. They often seem have poor lichens floras on the trunks and frequently only common species. By the water towers along Stoke Road there is an avenue of horse chestnuts (Mostly *Aeculus hippocastanum* but some are the *A. hippocastanum* hybrid *H. x carnea*) alternating with lime *Tilia x europaea* trees, which often have very rich lichen floras, of about the same age, position and with similar management and situated in a uniform habitat. Therefore I thought it would be interesting to compare the lichens on these two tree species. This is a rare occurrence and it was worth taking advantage of. I recorded the present of the lichen species on each tree trunk and the after examining 21 trees of each species, noted how many tree trunks each lichen species was found on. These data are shown in Figure I.

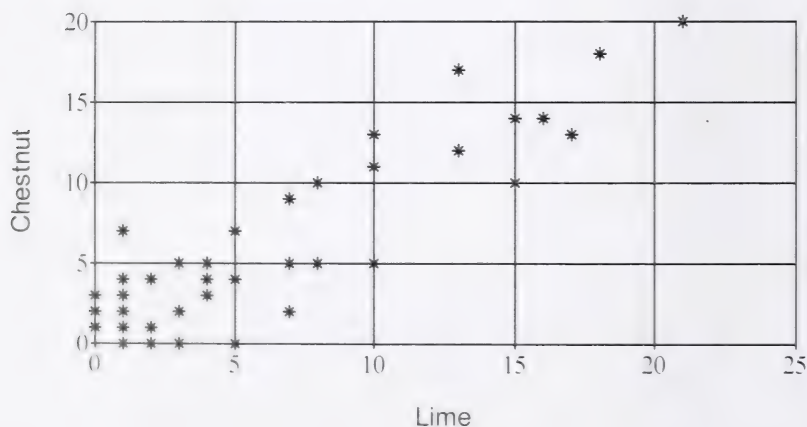


Figure 1. Coincidence plot of frequency of lichens on Lime trunks and Horse Chestnut trunks. Each dot refers to one or more species (total of 55 lichen species recorded and 21 limes and 21 horse chestnut trees examined).

The commonest lichen *Xanthoria parietina* was present on 20 of each tree species. The next was *Hyperphyscia adglutinata* – another nitrogen loving species. Given this environment and these trees there was little difference between the frequency of the species on the two tree types. Lime had 42 spp and 254 records and horse chestnut 45 spp and 248 records. In Britain as whole about 180 species have been recorded from Horse Chestnut but nearly 300 from Lime. One species on Lime is Nationally Scarce and one species where Britain has International Responsibility on Horse Chestnut. So we can say that on the downs the two appear to have quite similar floras but nationwide they are much more different (as indicated by the different relative frequencies the individual species have in Figure 2). The national data was collected over about 50 years and covers a time when nitrogen pollution was not so severe. A calculation of similarity (Sorensen Coefficient of Similarity) between the floras on the two trees for the downs is 0.762 (on a scale where 1 is identical and 0 is no species in common), for Britain as a whole the figure is lower at 0.656.

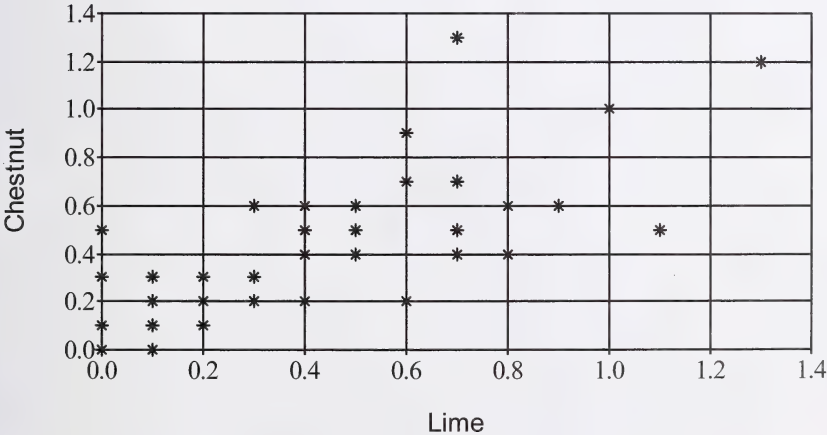


Figure 2. Coincidence plot of relative frequency of each lichen species on Lime trees (*Tilia* spp) (3494 records) and horsechestnut trees (*Aesculus* spp.) (1111 records) in whole of Britain (British Lichen Society Database. The data has been summarised.)

On the Downs the trees are made similar by heavy nitrogen pollution with most of the species are nitrogen loving species but less so across the rest of Britain. Of the lichens recorded on horse chestnut about 21% have a Conservation IUCN Status of Nationally Scarce, Nationally Rare, Vulnerable or a species for which Britain has International Responsibility, whilst for Lime it is very similar with about 19%; that suggests that these two species have more or less equal value for lichen conservation. However, surprisingly, two species, *Bacidia incompta* being IUCN Vulnerable and *Caloplaca luteoalba* being Nationally Threatened, have not or rarely been recorded in lime but have more records across Britain on Horse Chestnut than the nitrophile *Hyperphyscia adglutinata* which is abundant on the Downs. The acidity of the bark is important and trees which have acid bark like conifer trees have very poor lichens floras in lowland Britain. On the Downs the conifers have virtually no lichens present as can be seen by looking at the trunks of those by the Water Tower. It would be interesting to know if the invertebrates on the tree trunks show similar diversity patterns to the lichens.

Curiously, the lichens on the limestone do seem to be affected nearly so much by air pollution as those on trees. When looking at the limestone on the edge of the Gorge, I did not detect very noticeable an abundance of nitrogen loving lichens which will grow on limestone – quite unlike the situation on trees. In the past when sulphur dioxide pollution prevailed, limestone was relatively unaffected but then it was put down to the neutralising effect of the lime on the acidic sulphur dioxide. May be the lime is here neutralising the nitrogen oxide pollution from vehicles.

A striking feature of the lichens is that they show up where dogs have been urinating against tree trunks (Photo 1). The increase level of nitrogen has favoured some species and discourages others. The main ones to be encouraged are *Hyperphyscia adglutinata*, *Physcia orbicularis* and *Xanthoria perietina* whilst others are discouraged or absent (Table 1). The most frequent species in the dog-pee zone are also the most frequent species overall which emphasises the high level nitrification received generally by the Downs.

Table 1 Lichen recorded from the base of tree trunks where dogs cock their legs!

Above 40cm	Colour	Frequency*	Below 40cm	Colour	Frequency*
<i>Candelariella reflexa</i>	Yellow	R	-	-	-
<i>Flavoparmelia caperata</i>	pale yellowish	O	-	-	-
<i>Hyperphyscia adglutinata</i>	greenish grey	C	<i>Hyperphyscia adglutinata</i>	greenish grey	A
<i>Lecanora chlorotera</i>	Grey	F	<i>Lecanora hagenii</i>	Grey	R
<i>Parmotrema perlatum</i>	Grey	O	-	-	-
<i>Physcia adscendens</i>	Grey	C	-	-	-
<i>Physcia aipolia</i>	Grey	R	-	-	-
<i>Physcia orbicularis</i>	Grey	C	<i>Physcia orbicularis</i>	Grey	C
<i>Physcia tenella</i>	Grey	C			
<i>Puctelia jeckeri</i>	Grey	C			
<i>Ramalina farinacea</i>	Grey	R	<i>Rinodina oleae</i>	Dark greenish grey	R
<i>Xanthoria parietina</i>	yellowish orange	C	<i>Xanthoria parietina</i>	yellowish orange	C

*Abundant, Common, Frequent, Occasional, Rare



Photo 1 Dog-pee zone on a lime tree. The yellow take measure is about 12inches (30cms) long. The grey lichen in the dog-pee zone is *Hyperphyscia adglutinata* (greenish grey colour) and the small yellow patches, *Xanthoria parietina*.



Figure 2 Beech trunk showing the horizontally drawn out slower growing crustose lichens and circular patches of faster growing foliose lichens (yellow *Xanthoria parietina* and the grey circular patches are members of the *Parmeliaceae*).

Another curious feature that is easy to spot, especially on the beech trees at the tops of The Promenade, is the horizontally elongated patches of lichens on the tree trunks. This feature occurs when the rate of growth of the lichen is considerably slower than the rate of expansion of the trunk. These crust lichens grow so slowly that it is even slower than tree trunks grow (Photo 2). Also in Photo 2 are some circular yellow lichen patches – these are the foliose lichen *Xanthoria parietina* which is much faster growing. Also present are other grey foliose lichens which belong to the *Parmeliaceae*.

In summary the Downs has an interesting lichen flora and anyone interested can be introduced to it by following the Downs Lichen Trail on which some of the lichens featured in this article can be seen in situ. The Limes and Horse chestnut trees have provided us with useful information about the ecology of lichens on these trees. If you walk about the Downs look out for the Yellow *Xanthoria parietina*, the dog-pee zone and the stretching of lichens patches on tree trunks. All trees have potential for lichens whether they are nature or introduced and some introduced species can support surprisingly rich lichen floras. The Limestone outcrops are of conservation importance and support 5 or more nationally scarce species.

Acknowledgements: Thanks to Sheila Quin for alerting me to the value of the lichens of the Clifton Downs, Janet Simkin and the British Lichen Society for providing me with data from the BLS Database and Richard Bland and Tony Titchen for helping me with the identity of the horse chestnuts on the Downs.

Grassland and Scrub Management on Clifton Downs

Rupert Higgins

This article deals with management work that has been undertaken to enhance the nature conservation value of grassland and scrub on the Downs. Although it draws on knowledge gained through work carried out on behalf of Bristol City Council, any views expressed here are the author's alone.

Mickelwright and Frost (1987) give an overview of historical land use of the Downs, written at a time when nature conservation was first being seen as one of the objectives of management. In brief, the Downs had a long history of sheep grazing dating back at least to the Anglo-Saxon period, and probably much earlier. This produced what was described in 1717 as a "thick and tough pasture", which was doubtless rich in wild flowers and insects. Over the same period a number of quarries were worked on the Downs, ranging from small scale operations up to a large limestone quarry in the eastern part of the Downs. As urbanisation crept across the surrounding area during the nineteenth century the number of sheep fell from almost 2,000 to somewhere between 300 and 400 by 1872. Grazing ceased during the first world war and although it was resumed in 1920 an outbreak of scab led to its permanent cessation in 1924. Within a year mowing was introduced by Bristol City Council, first by horse drawn mowers and later using engines for power. In order to facilitate the mowing many of the small depressions were filled and features such as gorse and bracken brakes were removed.

Over the following sixty years, although the adjacent Avon Gorge continued to be a focus for both naturalists and the nascent nature conservation movement, there seems to have been little interest in the Downs themselves, apart from some bird recording focused on the growing scrub patches. The grasslands were subject to a regular amenity cut, whilst scrub and trees encroached across many of the banks and remaining depressions that were too steep to mow, although some of these were kept open on a rather *ad hoc* basis. Some areas, notably in the northern part of the Downs, were treated with fertilisers and dressed with fertile topsoils in order to facilitate football pitches and other forms of intensive recreation for which the growing city had an ever increasing need. It was probably widely assumed that the wildlife interest of the Downs grasslands was permanently lost. However, most grassland plants are perennial and are able to persist over long periods without setting seed so long as the soil nutrient status remains low. During the 1980s it became apparent that considerable botanical interest remained in some areas of grassland, particularly in the western part of Clifton Down. At the end of the decade the City Council yielded to pressure from the late Dr Frost of the University of Bristol, the Avon Wildlife Trust and others and allowed an area of tall grassland to develop close to Sea Walls, and nature conservation took its place as one of the objectives of Downs management.

The new management regime on this area of grassland was modelled on a hay cut: the grassland was allowed to grow tall until late July, when it was cut and the cut material, the arisings, was gathered and removed off site. The hay cutting was initially viewed as an experiment: there was, in particular, considerable concern that public reaction might be hostile. This was not the first City Council site where hay cutting had been used to encourage flower-rich grassland, but the Downs was by far the most high profile site to be managed in this way. In fact, public reaction to the tall grassland was overwhelmingly positive, and has remained so. The experiment was also highly successful from a wildlife point of view. Most of the grassland was dominated by Upright Brome *Bromopsis erecta*, with smaller areas close to the Gorge developing a much shorter sward dominated by Sheep's Fescue *Festuca ovina*. Although none of the true Gorge rarities have appeared on the Downs scarce limestone grassland plants such as Dropwort *Filipendula vulgaris*, Spring Cinquefoil *Potentilla tabernaemontani* and Crested Hairgrass *Koeleria macrantha* are present. Members of the public were impressed by showy flowers such as Black Knapweed *Centaurea nigra* and Bee Orchid *Ophrys apifera* and the rapid colonisation of the area by attractive insects such as Marbled White *Melanargia galathea* and Common Blue *Polyommatus icarus* butterflies and Six-spot Burnet *Zygaena filipendulae*. Many people also commented on the visual interest provided by the contrast between areas of short and tall grassland.

Following this success Bristol City Council set about identifying other areas that would benefit from a similar change in management regime and commissioned a series of surveys during the 1990s (Wessex Ecological Consultancy, 1994). These identified that, as suspected, species-rich grasslands were far more extensive extending across the Downs as far as their north-east corner. However, large areas especially in the central and eastern parts of the site were dominated by Perennial Rye-grass *Lolium perenne* and species-poor, lacking any plants that are not ubiquitous on intensively managed amenity grasslands. It was relatively easy to distinguish the species-rich areas: the stiff, blue-green and hairy leaves of Upright Brome are immediately visible and on closer examination the presence of herbs such as Wild Thyme *Thymus praecox*, Salad Burnet *Sanguisorba minor* and Burnet Saxifrage *Pimpinella saxifraga* marks out particularly diverse swards. Once the more valuable areas had been mapped a plan to gradually extend the hay cutting regime over much of the species-rich grassland, although this was felt to be inappropriate in some areas that were more heavily used by the public, including parts of several football pitches, and these continue to receive an amenity cut.

By and large this change in management has been highly successful and the Downs now offers the people of Bristol an opportunity to appreciate unimproved calcareous grassland, in the context of a popular open space, which is probably unique in Britain. The management has not been without problems, however. The most significant of these is that mowing was not the traditional management regime on

the Downs or probably on any comparable site in Britain. Throughout the country dry calcareous grasslands have for centuries been grazed by sheep. Within a few years of the commencement of hay mowing it appeared that low-growing herbs, such as Wild Thyme and Common Bird's-foot Trefoil *Lotus corniculatus*, which had been conspicuous components of the meadows in their early years, were becoming much less obvious. It may have been that they were simply less visible under the tall sward, but a decline in low-growing species is described in the National Vegetation Classification (Rodwell, 1992) as one of the consequences of the development of an Upright Brome-dominated sward. Similarly, long term monitoring at Totternhoe Knolls, Bedfordshire has shown that many plants decline in abundance, without disappearing altogether, following the replacement of grazing with mowing (Wells and Cox, 1993). The Lowland Grassland Management Handbook (Natural England 1999) recommends 2-15cm as the optimum range for sward height in upright brome dominated grasslands. The typical sward height on the Downs is 80cm. Conversely, monitoring of Upright Brome dominated grassland in northern Switzerland has shown that floristic diversity is greatest when the sward is cut in July, as it is on the Downs. This is the traditional management technique in Switzerland, and it appears that a different plant community has developed in response (Kohler *et al.*, 2005). On the Downs, comparison using quadrat surveys of hay meadows with species-rich swards still subject to amenity mowing confirmed that the decline in low-growing species was genuine, although offset by an increase in taller species such as Field Scabious *Knautia arvensis* and in short-lived perennials such as Yellow Rattle *Rhinanthus minor*, which are unable to persist in frequently mown grasslands.

Several solutions to this change were considered. The re-introduction of grazing still remains as a long term aspiration, but in the medium term there are many problems associated with fencing, dog worrying and traffic to be overcome before this can be seriously contemplated. A more realistic option would be to reduce the dominance of Upright Brome through more frequent mowing. At other sites in Britain success has been achieved through single additional cuts, either in May or in September. The main drawback with these from an ecological point of view is possible impacts on invertebrates: a May cut, in particular, might maximise floristic diversity but would reduce insect diversity markedly. A better alternative would be to implement different mowing regimes in different areas to create a variety of sward heights supporting the greatest possible diversity of species of both plants and insects. This approach has been used with some success on several nature reserves in Britain, including at Martin Down in Hampshire (Natural England, 1999). The greatest obstacle to this method is financial. Although it might be thought that a single hay cut each year would be cheaper than around ten amenity cuts the hay cut is actually significantly more expensive, largely due to the cost of gathering and removing the arisings. The cost of cutting areas more than once every year would be prohibitive, as would the management burden of organising and supervising a range of different regimes: the City Council has limited resources to commit to the Downs, and nature conservation is just one of several functions the site has to fulfil. As a consequence,

a compromise solution was proposed, whereby the areas of longer grass should continue to receive an annual cut whilst other areas of diverse grassland receive an amenity cut at a lower frequency than usual, and with the blades set higher to allow low-growing species to flower (Wessex Ecological Consultancy, 2002). In practice this has been difficult to implement and many areas of short grassland continue to be managed as before.

The necessary use of mowing, rather than grazing, to manage the grasslands has almost certainly limited the recovery of invertebrate populations. Mowing has several disadvantages over grazing for invertebrates. In particular, unless complicated mowing regimes can be implemented, it involves the removal of all of the plant growth at once and different sward heights do not develop as they do under grazing regimes, where various factors will cause stock to favour one area over another. Small scale poaching caused by grazing animals also provides opportunities for invertebrates to bask and burrow. However, some form of management is essential if an invertebrate fauna of limestone grassland is to be retained and enhanced: to quote Buglife "*the main threat to most species [of invertebrate on limestone grassland] is likely to be from encroachment of scrub and development of rank vegetation that may result from a lack of grazing.*" (Buglife, 2013).

Another issue has been the management of some of the steeper slopes, particularly at the banks above the road opposite the Zoo and around the former quarries near the top of Blackboy Hill. The zoo banks still retain patches of Common Rockrose *Helianthemum nummularium* and other limestone grassland species, but others such as Autumn Lady's Tresses *Spiranthes spiralis* seem to have disappeared. Species – rich swards, which decorated the former quarries well into the 1980s, have now been almost entirely lost to rank grassland and scrub. Growth of trees and scrub has also replaced diverse grassland elsewhere. This was partly as a consequence of the government-imposed introduction of compulsory competitive tendering in the 1980s, which meant that all management activities had to be specified in contract documents drawn up in advance, making small scale activities such as scrub removal almost impossible to implement. Where these problematic areas of grasslands are mown, as on the zoo banks, the thatch is almost always left to lie and floristic diversity declines.

The management of woody vegetation has also been the only area in which there has been serious conflict between nature conservation and public opinion. During the early years of the Millennium there was a vociferous campaign based on the misconception, perhaps wilful in some quarters, that the Council intended to remove all of the scrub from the Downs. There was never any intention to even significantly reduce the area of scrub, but the experience has left council officers understandably wary of any management of trees and shrubs. Tree removal is always an emotive subject, particularly when many people equate nature conservation with the

preservation and encouragement of tree growth. In fact, the cover of both trees and scrub on the Downs has grown enormously over recent decades.

Scrub has features of nature conservation value, in particular for birds and invertebrates, and limited quantities should be encouraged as part of the Down's biodiversity. In particular, the Downs has a significant but declining population of mature Hawthorn *Crataegus monogyna* bushes and dense patches of Ivy *Hedera*

helix, which support the parasitic Ivy Broomrape *Orobancha minor* and provide a food source for many birds and insects. Another feature of scrub on the Downs is the abundance of Wild Madder *Rubia* peregrine supporting the scarce Pyralid moth *Mecyna asinalis*. However, dense and even-aged stands of immature Ash *Fraxinus excelsior*, Holm Oak *Quercus ilex* and Sycamore *Acer pseudoplatanus* support an extremely limited range of species and the growth of this habitat at the expense of irreplaceable and threatened limestone grassland represents a real loss of biodiversity.

The ideal solution would be to remove areas of this low quality woodland to encourage the regeneration of scrub, whilst scrub is removed from the patches of limestone grassland. By these means the overall extent of scrub could be maintained, whilst the area of limestone grassland is protected or, in places, extended. This recognises that whereas scrub can develop rapidly on a whole range of soil types, calcareous grasslands takes decades (or even longer) to develop on a very limited range of soils. In many instances the best outcome for nature conservation would be to remove sapling trees from the centre of patches of scrub whilst retaining low growth of species such as Bramble *Rubus fruticosus* agg and Wild Privet *Ligustrum vulgare*, which provide valuable wildlife habitat. As the older Hawthorn bushes reach the end of their lives it would be beneficial to identify younger specimens that should be allowed to grow on to eventual senescence as standard specimens in isolation from other scrub. In practice management has often resulted in valuable scrub being removed whilst the saplings are retained, without any consideration of the size that these saplings will ultimately reach. In the long term these works will allow the development of further areas of even-aged secondary woodland and, despite the commitment and enthusiasm of those carrying them out, will achieve little for nature conservation. In several places trees have been retained, or even planted, in positions where they will eventually shade out large areas of valuable grassland.

Future management of these habitats on the Downs will largely depend on the resources that Bristol City Council feel able to devote to nature conservation on the site, and will require a certain amount of courage when it comes to tree removal. The strong possibility that Ash die-back *Chalara fraxinea* will kill a large proportion of the Ash population of the area adds a degree of unpredictability to vegetation

succession on and around the Downs. The spread of Ash die-back will have a devastating impact on woodlands and many associated species, but on limestone grasslands through our area, including the Downs, where Ash is a major invasive species, it will also bring opportunities. If some biodiversity gain is to be salvaged from this coming disaster, the opportunity should be taken to restore limestone grassland on areas that have been invaded by Ash. On the Downs, and in the Avon Gorge, replacement tree planting should be targeted at areas where grassland re-establishment is not viable. In the long term the introduction of different mowing regimes, carefully targeted at areas where species that would benefit are present, or even the re-introduction of grazing would be most welcome. Either would require the allocations of considerable resources and probably the appointment of a warden.

Another long term objective for management should, in my view, be to re-establish connections between the Downs and the Gorge. The current division between the two, although it may appear inevitable, is a consequence of the abandonment of grazing. When the Downs was grazed, sheep roamed into the Gorge and the flora and fauna of the two sites, as well as the landscape, were much more similar than it is now: the Gully was referred to as part of Durdham Down in most early works of natural history. As Ray Barnett comments elsewhere in this Issue, there is now suitable habitat on the Downs for several species of insects now present only in the Gully. Removal of the scrub and trees that separate the two would facilitate recolonisation of the Downs. It may be too much to expect the rare plants found in the Gorge to re-colonise the Downs but consideration could be given to re-introduction, perhaps starting with the most threatened of the Gorge rarities, Autumn Squill *Scilla autumnalis* and Honewort *Trinia glauca*.

REFERENCES

- BUGLIFE (2013). Advice on Management of BAP Habitats: Lowland Calcareous Grassland
- KÖHLER, B *et al.* (2005). Changes in the Species Composition and Conservation Value of Limestone Grassland in Northern Switzerland After 22 Years of Contrasting Managements. Perspectives in Plant Ecology, **7**, 51-67
- MICKELWRIGHT, S.D. & FROST, L.C. (1987) Historical Land Use of the Bristol Downs as Common of Pasture. Proceedings of the Bristol Naturalists' Society, **47**: 27-32
- NATURAL ENGLAND (1999) Lowland Grassland Management Handbook. 2nd Edition: Chapter 2
- RODWELL, J.S. *et al.* (1992) British Plant Communities Volume 3: Grasslands and Montane Communities, University of Cambridge Press, pp166-169
- WELLS, T.C.F. & COX, R. (1993) The Long-term Effects of Cutting on the Yield, Composition and Soil Nutrient Status of Chalk Grassland, English Nature Report, No. 71
- WESSEX ECOLOGICAL CONSULTANCY (1994-2002) A series of unpublished reports to Bristol City Council

The Grasses of the Bristol Downs.

Tony Smith

Grass is so fundamental and yet most people never dwell on its importance. This article describes a new survey of the grasses of the whole of Clifton Down limestone plateau. Grasses have a flower-head of tiny, green-brown florets at the top of a stem and have green leaves. The leaf has three parts, the lower part sheathes the stem and is called 'leaf sheath' and the upper part is just a tiny whitish 'tiara', called a *ligule* (tongue) and outside that is what most people would call 'leaf' but is properly called the 'leaf-blade' or *lamina*. Around the base of the plant fibrous roots arise in a ring, usually several rings. These roots bind the soil and since grass plants are so numerous they are an important structural element in grassland stability.

Grasses have wind-pollinated flowers in contrast to many herbs whose flower colours attract insects for pollination. Butterflies feed on nectar from colourful flowers, such as Brambles, Ground Ivy, Thyme, Red Clover, Gorse and Kidney Vetch, but they lay their eggs on their caterpillars' food plants and often these are grasses. For the Gatekeeper, Grayling, Large Skipper, Small Skipper, Marbled White, Meadow Brown, Small Heath, Speckled Wood and Wall Brown, these range from rank perennials such as Couch grass, Cock's-foot grass, Tufted Hair-grass and Timothy to Annual Meadow-grass, Red Fescue, Smooth Meadow-grass and others, all found on the Clifton Downs.

Details of the limestone vegetation of the region can be found by reference to *The Flora of the Bristol Region* (2000) where the differences between unimproved, alkaline, neutral and acidic grassland are expertly explained. Grass plants can be identified to species without too much difficulty so in this article I hope to explain some of their characteristic features and relate them to the special nature of the Downs vegetation. And your reward, dear reader, is that you will immediately be able to amaze your friends with your grass identification expertise.

The Downs has a long history of use by man (See Micklewright's report for the University of Bristol, *Wildlife Survey of the Bristol Downs*, Report No. 13 [1988]) from lead mining and sheep grazing and changes due to modern population pressures including leisure pursuits (with up to 32 football pitches, covering more than 30% of the level plateau) but it is essentially, a limestone grassland. Although altered and repaired inappropriately and reseeded with imported species, across the whole area one repeatedly comes upon lime-loving grasses and herbs.

This vegetation is managed by mowing with a three inch cut every ten days or so in the growing season. Soil depth affects the rate of growth, so that less frequent mowing is carried out on the thinner soils that more easily dry out. Cutting is of value to the grassland habitat in that 'it is like a forest beneath your feet and cutting the canopy allows light to penetrate to the soil', as Mr John Bowyer, who is in charge of this work informed me. This regime allows only a brief cover of clippings to keep in moisture in contrast to infrequent cutting leading to the deposition of a sodden persisting damaging blanket.

Over the last 30 years or more several vegetation studies have given an outline of the historical use and nature of the Downs. From these it is clear that it is not now possible to be sure exactly how and when the present vegetation developed, but the Downs have probably been grazed for over a thousand years.

Limestone-loving plants, calcicoles.

One of the defining characteristics of the Downs is limestone-loving plants or 'calcicoles'. Among the grasses, Upright Brome, Quaking Grass, Crested Hair-grass, Yellow Oat-grass, Downy Oat-grass and Meadow Oat-grass can be found locally. The calcicole herbs that are found on the Downs are Bulbous Buttercup, Salad Burnet and Red Clover, with Bird's-foot Trefoil, Ladies Bedstraw, Dwarf Thistle and Burnet-saxifrage. There are several other colourful flowering plants to be found abundantly on the downs even though they are not particularly lime-loving plants. These include hawksbeards, hawkbits and Common Knapweed, which may not have a requirement for calcareous soil but which require light, well-drained soil.

Signs of damage, the marginal vegetation.

Certain species such as Dandelions, Daisies, Greater Plantain, Perennial Rye grass and Annual Meadow-grass are tolerant of frequent flattening by hundreds of human feet, as along paths, in gateways and playing fields. Plants able to survive this attrition are described as 'marginals' and their presence in a vegetation indicates hard conditions. On the other hand, those that cannot survive trampling may have virtues we adore. In the U.K. as a whole we have lost nearly all our flower-rich meadows and people are worried by the loss of bees, bumblebees, butterflies and birds. Mute-hued grasses maintain, support and nurture colourful flowers and a vast number of undervalued insects and other creatures.

Identification of some grasses

Grasses' names, fescues, bromes, ryes, hair-grasses and bents, may trip glibly off the tongue and one can recognise many different species without too much difficulty. People will be very impressed with your expertise on the Downs – if you practise a bit beforehand - when you pick a grass leaf, seemingly at random and show them that, as it is held up to the sky or against a dark background that there are fine white 'eye-lashes' along the edge (#1 illus.): '**Upright Brome**' you will say, and get them to find the same and hold it as you have done.

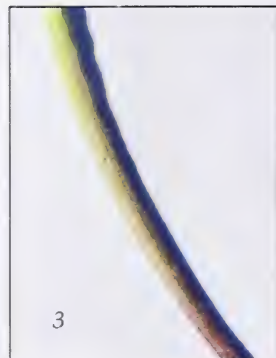
Then you pick up another grass, whole from the root, with narrow, shiny green leaves, and you point to the maroon red colour at its base (#2 illus.) and tell them, '**Perennial Rye grass**'. Again get them to find it too.

There is no stopping now! Find the softly hairy grass and right at its base, the 'pink pyjamas'. The lowest part of the stem is pink in vertical stripes like a pair of Pyjamas (#3 illus.): '**Yorkshire Fog**', you pronounce.

Grab another grass with compressed (flattened) white stem bases and the grey-green leaves obviously folded along their lengths (#4 illus), a tussocky, dominant, spreading grass: it is **Cock's-foot grass**.

Where there are tufts of long, very fine, deep-green leaves you are likely to have **Red Fescue** but look at the way the edges of the leaf come round the shoot and join like the neckline of a Nightie in front to confirm (#5 illus). Sheep's Fescue is similar but the edges overlap together, like a Dressing gown.

Finally, look for the grass creeping over the soil and pick it from as far down as you can and you will see that it has nodes where it changes direction. There arises from a node a new shoot (#6 illus): this is **Creeping Bent**. You have become in five minutes an expert with six or seven grasses!



Grassland Survey results

The proportion of each grass species in fifteen one square metre sites spread across Downs was estimated. Three sites were chosen in the meadows, three on or close to soccer pitches and eight on mown amenity grassland. 17 species were found, but 12 of them formed just nine percent of the total. Rye Grass accounted for 40% and Upright Brome for 31%. The three meadow sites were dominated by Upright Brome, and three of the mown amenity grassland sites were similar. Two of the pitch sites and three of the mown were dominated by over 80% Rye Grass. The three meadow sites and five others had five or more species. Rye Grass, Upright Brome and Cocks Foot were present in more than 60% of the sites, Red Fescue, Yorkshire Fog, Creeping Bent and Crested Dogs tail in more than a third, Soft Brome in a fifth.

Species	%
Rye Grass	30
Upright Brome	38
Creeping Bent	10
Cocks Foot	6
Yorkshire Fog	3
Crested Dogstail	6
Red Fescue	3
Soft Brome	p
Wall Barley	p
Crested Hair Grass	p
Rough Meadow Grass	p
Sweet Vernal Grass	p
False Oat Grass	p
Common Bent	P
Timothy Grass	p
False Brome	p
Annual Meadow Grass	p

Table 1 Overall percentage structure of species

	All sites	Meadow	Mown	Pitch
Rye Grass	30	4	42	68
Upright Brome	38	60	26	17
Species	17	8	4	4

Table 2 Comparison between types of site and the overall structure

Mention must be made of the great change in emphasis that has occurred since Micklewright's report in 1988. He showed that open areas in the region were mostly being managed without reference to conservation issues, even for the wildlife in the botanically rich area of the Downs. Now the Downs and many other sites are being managed sympathetically and appreciated for that by members of the public. More importantly, nowadays people understand much more that this rich flora and fauna needs to continue to be protected. Wessex Ecological Consultants on a regular basis (2006, 2008, 2009, 2010, 2011, 2012 and 2013) have been carrying out scientific surveys to monitor the vegetation since the start of occasional use of part of the Downs as overflow car parking for the Zoo and have shown that, judged against more protected areas, there has been no measurable loss of species and indeed in 2013, out of a total of 38 species, there were 11 more species recorded in the overflow parking area than in an adjacent protected area. Further, there were three more out of ten calcicole species and one more out of three calcicole grasses. However, this does not mean that soil compaction is beneficial to limestone grassland! This is because looking at wider areas we have already noted that more species occur than are recorded in any particular patch.

Conclusion.

The lists of grass species in my survey in the Zoo parking area and in the meadow to the south of it, are rather similar with nine grasses and nine herbs in the parking site and nine grasses and 14 herbs in the meadow, though the species are not quite the same with two Meadow-grasses in the parking area and two calcicole grasses in the meadow. In the parking area there is some vegetation damage and soil compaction by vehicles, especially in wet weather, which cannot just be reversed in dry weather, allowing Perennial Rye grass and Annual Meadow-grass to become more frequent and creating patches colonised by the marginal plants Greater Plantain and Dandelion. In their regular reports, cited above, Wessex Ecological Consultants explain some mitigation measures for this damage once the vehicular use is terminated. In the meadow area Upright Brome is the major grass with no intrusion by marginals. An undamaged carboniferous limestone vegetation no longer exists on the Downs but this study shows the persistence of a significant calcicole flora supported by a sympathetic management regime.

Sites surveyed

MR	Area, nearest feature	No	Type
ST562 747	Sea Walls	9	Pitch
ST565 743	Ladies Mile	5	Mown
ST565 744	Meadow	7	Meadow
ST565 747	Whitebeam clump	8	Mown
ST566 741	Meadow south of Parking	2	Meadow
ST566 742	Parking area	1	Mown
ST566 743	Ladies Mile	4	Mown
ST566 745	Meadow	6	Meadow
ST566 748	Baker's path	10	Pitch
ST567 743	Ladies Mile	3	Mown
ST567 751	Stoke Road	11	Mown
ST568 743	Pound	15	Mown
ST569 745	Baker's path	14	Mown
ST569 748	Circus site	12	Pitch
ST572 748	Blackboy	13	Mown

Table 3 Grid refs of sites surveyed, site name, site number and site type.

References:

The Flora of the Bristol Region, Green, IP., Higgins, RJ., Kitchen, C. and Kitchen, MAR. BRERC (2000)

Making a place for wildlife. S.D. Micklewright, (1988), *A Survey of Clifton and Durdham Downs with Recommendations for Conservation Management*, Department of Botany, University of Bristol.

Vegetation Monitoring, Land at Ladies Mile, Clifton Downs, Bristol Zoo Car parking area, (2013) Wessex Ecological Consultants.

Insects of the Bristol Downs

Ray Barnett

To the casual visitor the Bristol Downs represent a green oasis from the urban sprawl, a place to breathe the air, admire the view of the Avon Gorge, engage in some recreation (whether organised or ad hoc) and to generally relax. It may be assumed that this by its very nature is a good place for wildlife and indeed it is, but what looks simple on the surface is surprisingly complex. The type of plants and animals one can find here, including the invertebrates, reflect both its historic and even pre-historic nature followed by centuries of change brought about by the actions of people.

Invertebrate populations such as those of insects, thanks to their very short and often annual life-cycles, change and alter much more quickly than the relatively slower growing plants. In addition, where adapted to very specialised ecological niches these populations may change more rapidly than those of vertebrates such as mammals and birds. Although standing on a bedrock of Carboniferous limestone, the grassland of the Downs has been changed from that naturally occurring, particularly by activities in the 20th century when grazing by sheep ceased, hay making by hand was replaced by mechanised mowing and top soil and fertilisers were applied to parts in order to improve its condition for recreational purposes such as football and cricket.

For the last couple of decades the policy of a close mown sward throughout has been allowed in places to be replaced by a late cut after flowering, designed to encourage a more representative limestone flora to re-emerge. In these areas the entomologist can find a healthy and very typical fauna of improved grassland as found throughout the Bristol and Bath area. In summer a sweep net will be full of grass bugs such as *Stenodema laevigatum*, *Leptopterna dolabrata* and *Stenus binotatus*. Other common 'true bugs' will include the Bishop's Mitre shieldbug *Aelia acuminata*, the common capsid *Capsus ater*, the very active *Rhopalus subrufus* and the ubiquitous flower bug *Anthocoris nemorum*. Beetles will be represented by the blood red *Rhagonycha fulva* usually in mating pairs and two *Oedemera* species, the smaller and more delicate *O. lurida*, almost as common as the more obvious *O. nobilis* or Thick-kneed Flower Beetle, so named from the swollen hind femora of the male insect. In some seasons there may be swarms of the Garden Chafer *Phyllopertha horticola* and very occasionally large numbers of the Summer Chafer *Amphimallon solstitiale*, the latter taking to the wing at dusk on warm sultry evenings.

To many though it is the butterflies which are the most obvious and most appealing insects and this grassland is home to 'browns', the butterflies whose larvae in the main feed on grasses, such as the Meadow Brown *Maniola jurtina* and Marbled White *Melanargia galathea*. Closer to the scrub and trees will be found the Ringlet *Aphantopus hyperantus* which prefers the deeper more luxuriant and damper grass. But the butterflies are accompanied by their close congeners the moths and as one walks through the grass, species such as the grass moths *Chrysoteuchia culmella*, and *Agriphila straminella* will fly up in front of you to then resettle, wings wrapped around the body, on a grass stem.

The variety of insect life in these meadows is always a delight and alongside the orders of insect represented above will also be members of the hymenoptera such as larvae of the grass feeding sawfly genus *Dolerus*, often mistaken for butterfly larvae, honey bees and several species of bumble bee such as *Bombus lapidarius*, *B. pascuorum* and *B. lucorum* agg., let alone solitary species of bee and wasp and huge numbers of individuals of ant species. The 'true flies' the diptera are present in a great variety of forms from the wing waving *Sepsis fulgens*, whose larvae help to remove those things that some dog walkers leave in their wake, to the predacious robber flies such as the surprisingly delicate looking *Leptogaster cylindrica* and numbers of the easily overlooked hoverflies such as *Melanostoma mellinum*.

In late summer the orthoptera come into their own and the Common Field Grasshopper *Chorthippus brunneus* and Meadow Grasshopper *C. parallelus* occur in impressive numbers. On the bramble and scrub will be found the Speckled Bush-cricket *Leptopyges punctatissima*, which appears all green until a hand lens reveals the speckling with black dots, and the large and impressive Dark Bush-cricket *Pholidoptera griseoaptera*. With all these insects present it is not surprising that there are very large numbers of spiders to prey on them with the grasses teeming with the straggly *Tetragnatha montana* and, if you are lucky, the beautifully camouflaged *Misumena vatia* sitting at the heart of a flower awaiting an unsuspecting pollinator to alight.

Dispersed across the grasslands of the Downs are various individual or clumps of trees, often originally planted to give variety to the landscape. With no grazing taking place on the Downs currently an associated scrub layer often surrounds the smaller trees such as the hawthorn with bramble, cow parsley, holly and ivy and even self-set trees such as ash rapidly establishing. It is at these clumps that the bush-crickets may be best found representing an associated fauna of their own. In the spring the hawthorn blossom supports large numbers of the small longhorn beetle *Grammoptera ruficornis* whose larvae live within dead and decaying shoots and twigs. Beating the 'may blossom' is also a good way to find tree loving ladybirds such as the yellow and black 14-spot *Propylea 14-punctata* and the red and cream

Cream-spot *Calvia 14-guttata*. Rose Chafer beetles may fly around these bushes on warm days and occasional treats such as the longhorn beetle *Anaglyptus mysticus* be noted. The holly flowers are the location for the egg-laying of the Holly Blue butterfly and again in the autumn the second brood lays its eggs, but this time on the ivy blossom.

Large individual trees can reveal specialist species and the leaves of the horse chestnuts in late summer turn brown, not these days due to the early onset of autumn but due to the truly monumental numbers of the larvae of the tiny moth *Cameraria ohridella*, also known as the Horse Chestnut Leaf Miner. Each leaf may have a dozen or more individual larvae eating away between the upper and lower epidermis. On suitable days clouds of the very beautiful tiny moths may be flying around the trees having just emerged from their pupae. A recent arrival in the UK, concern has been raised about the effect of these swarms upon the efficiency of the tree to photosynthesise, fortunately the main impact is late on in the season when the tree has completed much of its seasonal growth and set seed.

Bordering the Downs along Clifton Down Road and also along the edge of the Avon Gorge are more scrubby and wooded areas. Here a different group of insects may be located, species such as the Lesser Stag Beetle *Dorcus parallelipipedus*, whose large larvae make impressive borings in dead wood and the related, smaller but horned *Sinodendron cylindricum*. The woodland glades are home to Speckled Wood *Parage aegeria* and Comma butterflies *Polygonia c-album* with hoverflies such as the drone fly *Eristalis tenax* patrolling their territories of patches of sunlight on the lookout for females. Despite the lack of standing water on the Downs, dragonflies such as the Southern Hawker *Aeshna cyanea* occur at times, feeding up on other insects before returning presumably to nearby garden ponds to breed. A variety of galls may be found on the trees such as the Oak Marble Gall caused by the gall wasp *Andricus kollari* and the larvae of the bagworm moth *Luffia ferchaultella* may be found grazing on the lichens growing on tree trunks, a species which reproduces parthenogenetically.

Despite this richness of insect life, the greatest entomological interest actually lies not on the Downs themselves but within the Avon Gorge. The Gully, for example, the gash in the side of the Gorge which cuts down the side of the cliffs from the Downs on top to the river below, is home to great rarities such as the Silky Wave Moth *Idaea dilutaria*. This species is restricted by its need for relatively high temperatures as a larva, to well drained suntraps where rockrose grows and so occurs along the cliffs of the Gorge but not on the Downs themselves. However, the Gully is home to species which may not be so limited if other environmental conditions were restored to their pre-20th century state on the Downs.

The Chalkhill Blue butterfly *Lysandra coridon* is one such species which exists as a small colony in the Gully, limited by the need for horse-shoe vetch plants (a limestone and chalk specialist) sufficiently exposed to the sun to allow their fussy caterpillars to eat and develop successfully. If these conditions were available on the Downs, as they probably were a century or more ago, this now rare species could potentially recolonize the Downs' grassland. Even more likely to expand back onto the Downs is the Green Hairstreak butterfly *Callophrys rubi* which occurs in the Gully and is much less fussy about temperatures just requiring short turf with bird's foot trefoil as a larval foodplant. Aside for the lepidoptera, grassland leaf beetles (Chrysomelidae) such as *Cryptocephalus bipunctatus*, *C. moraei* and *Chrysolina oricalcia* and the largely coastal Sulphur Beetle *Ctenopus sulphurus* are other candidates for species which could expand onto the Downs if conditions were right.

The collections of paintings and drawings held in Bristol Museum & Art Gallery reveal how in the early 19th century the Bristol Downs were almost completely clear of trees, limestone grassland closely cropped by grazing sheep and rabbits. Such a habitat explains the report in the Proceedings of the Bristol Naturalists' Society for 1866 whereby 'Mr Clarke exhibited a nice series of *Lycaena Adonis*, captured during the summer on Durdham Down.' The *Adonis Blue* is even rarer than the Chalkhill and there are no known colonies in our local area currently. Its larvae also feed on horse-shoe vetch and are even more discriminating than those of the Chalkhill when it comes to needing high temperatures (created by a closely cropped sward) in order to complete development. Its presence in the 19th century reveals that at that time species such as it and the Chalkhill Blue (and no doubt many other insects) would not have been confined to places such as the Gully but would have occurred more widely across the Downs themselves.

Even in the Gully such species seemed to be under severe threat by the early 1990s and limestone grassland specialists such as the Grayling butterfly *Hipparchia semele* had disappeared by the 1970s. Grazing in the Gully with goats has now been introduced and as well as benefitting the rare flora should also assist the survival of the specialist insect species there.

It is perhaps ironic that, at a time when the value and importance of the limestone grassland flora and fauna has been recognised, and the intrusion that much of the woodland represents to that habitat, a rare fauna associated with the deadwood habitat has also now been found in the Gully. Beetles such as *Tillus elongatus* and *Platycis minutus* and an associated fauna eg the snakefly *Xanthostigma xanthostigma*.

Finally, to return to the Downs themselves we should not forget that they have played a role in entomological history. John Sircom Junior, regularly visited the Gorge and Downs from his Brislington home and as well as reporting the discovery of the Silky Wave moth from the Avon Gorge he also described the micro-moth *Elachista beddella* as new to science from a specimen he took on the Bristol Downs in 1848. The national moth expert Henry Tibbats Stainton named a related species *E. trise-riatella* as new to science in 1854, again from a specimen from Durdham Down. Stainton's 'Manual' published in 1844 listed *Coleophora fuscocuprella* as only known from the Bristol Downs (although today we know it be widespread). One of the special things about the Avon Gorge is that there are unique species only known from the location, a fact honoured in the naming of some as, for example, the *Bristol* White, *Bristol* Rockcress and the *Bristol* Onion.

Perhaps it is a shame that the moth named as new to science by Stainton in 1849 as *Ypsolophus durdhamellus*, and sometimes referred to as the Durdham-down Crest, is no longer called by either name. Under the international rules of zoological nomenclature the first name given to a species stands and Stainton was unaware that *Y. durdhamellus* had actually already been named the year before in Germany and so now is known as *Acompsia schmidtiiellus*. To add insult to injury entomologists seldom use English names for micro-moths and so not even amongst micro-moth specialists is the name of Durdham Down perpetuated in honour of the wonderful Bristol Downs.

Butterflies of the Downs and Bristol side of the Avon Gorge

Martin Collins

Summary

The results from two butterfly transects on the Downs 2010-13 are reviewed. Taken together the two sites sampled were visited by 31 of the 59 UK species of butterflies. 28 of these species formed a “resident” community, and three, Clouded Yellow, the Adonis Blue and the Wood White were seen only occasionally. The Gully transect regularly has higher populations of butterflies and a greater diversity of species than the Downs Plateau transect, and there is less variation in numbers and species in the latter. Some issues relating to butterfly conservation are discussed with particular reference to the conservation of rare and endangered plants in the context of the Gully, and to the possible implications of climate change.

Introduction

The Friends of the Downs and Avon Gorge (FOD+AG) was formed in 2008 and in 2009 two butterfly transects were registered with the UK Butterfly Monitoring Scheme (UKBMS) and a team of FOD+AG volunteers was trained in the arcane arts of spotting, identifying and recording the butterflies¹.

The two transects are close together, at one point almost touching each other, and therefore share common features, in particular the underlying limestone bedrock, with its influences on the soil. Nevertheless they are also sufficiently distinctive, in for example their topography, microclimate and land use, to make their parallel monitoring instructive. The initial intention was a single transect on the Downs plateau and incorporating The Dumps, Zoo Banks and the Wildflower Meadow on Clifton Down. However the presence of the steep-sided Gully (Walcombe Slade) leading from the Downs plateau down to the floor of the Avon Gorge, together with the proposal, as part of the Avon Gorge Management Plan², to introduce a small herd of feral goats into the enclosed Gully for conservation purposes, was too good an opportunity to miss. Our second transect was therefore located in and above the Gully, where we had just one season (2010) to obtain some baseline data before the six Kashmiri goats from North Wales were introduced at the end of June 2011.

The Downs Plateau Transect.

The transect is 3500 m long and covers Fairyland, the Meadows, Ladies Mile, The Dumps and Zoo Bank. It thus includes a variety of habitats including woodland and woodland edge, meadows, and mown parkland.



The Gully Transect

This is 1300m in length. This transect appears rather tortuous partly because the site involves a vertical drop of 100m in a horizontal distance of 300m, and partly because we have tried to incorporate the sampling "cells" used in a 2009 survey carried out for Bristol CC by the Wessex Ecological Consultancy. The site is a very steep sided valley clothed with Ash and Yew, and browsed by the goats, who have made a substantial difference to the plant population in three years, opening up many areas and reducing Hazel and Buddleia scrub.



ST56

ST74

100m

FOD+AG Transect 2 The Gulley & Walcombe Slade

Survey Results

To put the following data in context, it is important to recognise that the purpose of the UKBMS Survey is to obtain a nationwide picture of the abundance, diversity and distribution of butterfly communities and thus a measure of their health and conservation status. The monitoring technique adopted reflects the intention to maximise the discovery of resident species in each area sampled. Hence the weekly walking of each transect will as far as possible be carried out in the most butterfly-friendly conditions so that any butterflies present will be encouraged to be active and so be visible to the recorder.

It is clear that butterflies, even those like the Ringlet which have been recorded in light summer rain showers, prefer warm temperatures and sunny open skies. Over

the four completed years of the study temperature and open skies appear to have a marked influence on numbers as shown by Figure 1 in which it can be seen that the temperature in the Gully is between 0.4°C and 1.6°C above that of the Downs and % open sky was greater by an average of 8%. The latter is, of course subjective and is determined in part by when observers were able to collect data. In ecological terms the difference in temperature is considered to be significant.

The tables below show the weather and counts summaries for the two transects for 2010 - 2013. Figures are derived from data collected on the days on which transects were walked ie once/week between April 1st and September 29th (26 weeks) except for rainfall for which figures were obtained from local records collected and compiled by Richard Bland³, for which many thanks.

Transect 1 – Clifton-Durdham Down

Year	Avg. Temp	Avg.Open Sky	Avg. Rain/Month	Species	No of butterflies
2010	20.8°C	58%	64mm	25	385
2011	20.3°C	54%	67mm	24	332
2012	18.9°C	49%	133mm	18	227
2013	19°C	60%	64mm	21	588

Transect 2 – The Gully

Year	Avg. Temp	Avg.Open Sky	Avg. Rain/Month	Species	No of butterflies
2010	21.2°C	62%	64mm	26	621
2011	21.9°C	62%	67mm	26	623
2012	19.5°C	57%	133mm	24	466
2013	20.6°C	71%	64mm	25	1001

There is consistency in the diversity of species throughout the four years of the study in the Gully despite the significant variation in numbers recorded, from a low of 466 in 2012 to a high of 1001 in 2013. However the dismal summer of 2012 took its toll on species diversity recorded in the Downs transect with an apparent decline of 25% on figures for the previous two years and numbers here over the four years were on average only 55% of those in the Gully.

Summary of data 2010-2012

With four years of data to review, emerging patterns for 2010–2012 will be considered followed by a presentation of the data from 2013 to provide the most recent state of the butterfly communities in the area. For those wishing for more detail of the first three years, the records will shortly be available on the FOD+AG website⁴.

Each of the five families of UK butterflies are represented in the Downs and Avon Gorge communities, *Hesperiidae* (Skippers), *Pieridae* (Whites and Yellows), *Lycaenidae* (Blues, hairstreaks and Coppers), *Nymphalidae* (Vanessids and Fritillaries) and *Satyridae* (Browns)⁵.

The skippers. The Small and the Large are found in the meadow sectors of both Downs and Gully between the end of May and early September. The Dingy Skipper is also a summer species but is less often seen here, and possible sightings of the Essex Skipper (not officially recorded) are not unexpected as this species has been spreading west and north from its Eastern strongholds for some years.

The Whites are strongly represented both in numbers and in seasonal duration. Small, Large and Green-veined have been recorded in significant numbers from April through to late September in all but the wooded sectors of both transects. The overall preference for the Gully referred to above is reflected in the former two species with recordings of their presence for 70% of the season compared to only 34% of the season on the Downs. The Orange Tips have a shorter presence from April to June, but during that time, in the Gully, were virtually ever-present accounting for a condensed 22% of the season.



Marbled White. M Collins

Of the yellows, the Brimstones have two fairly distinct flying seasons, in April and then again between June and September. Thus far, the few sightings of the Clouded Yellow have been in September when they would be expected to be moving South so the probability is that the Gorge represents a convenient stop-over on its migration routes. A welcome sight, associated in my experience with the Jurassic Coast of Dorset, where in recent years it has been known to overwinter⁶, but perhaps destined to become a more regular presence on the cliffs and attendant meadows of the Avon Gorge.

Of the *Lycaenidae*, the only Hairstreak so far recorded is the Green Hairstreak. Always an early visitor to the Gully, it has been spotted at various locations, which share warm temperatures and maximum exposure to direct sunlight. According to Barnett⁷, an established colony of this beautifully camouflaged species is located in the Avon Gorge, although the precise location is not given. This species has not been reported on the Downs.

The Blues. It is possible to see several Blues here through most of the spring and summer, although not the same species throughout. In April and May, and then again in September, the species that delights the eye and the spirit is the Holly Blue. Mostly seen around sub-canopy height, its double flying season is supported by Holly flowers in the spring and Ivy flowers in the late summer. The presence of both plant species in both transect sites probably accounts for the fact that this butterfly, unlike most of the others, is present in similar numbers and for similar durations in both sites.

During the summer months from late May until early September four other Blues are to be found. Most abundant of the four, and present in both sites, is the Common Blue. Its distribution is effectively demarcated by the open meadow habitat sectors in both transects, with Sector 5 on the Downs and Sectors 7, 8 and 9 in the Gully being their favoured haunts. In the Gully, particularly around the scree slopes of Sector 7, favourable for a variety of reasons considered later, healthy numbers of Chalkhill Blues have been in residence since the start of monitoring in 2010.

The fewer numbers and less frequent sightings of Small Blue and Brown Argus have also been restricted to Sectors 7, 8 and 9, probably due to a combination of the open meadow habitat, and the availability of favoured food plants here. Both Small Blue (1957) and Chalkhill Blue (1991) had disappeared from the area for protracted periods during the twentieth century before returning, the former in 2005 and the latter in 2007⁸. It is encouraging that both species appear to be persisting, albeit rather unconvincingly in the case of the Small Blue.

The vanessids, perhaps unsurprisingly given the generally widespread distribution of most species, are well represented and, once again more numerous in the Gully than on the Downs. Those that overwinter as adults, Red Admiral, Peacock, Small Tortoiseshell and Comma, have shown the conventional pattern of early spring followed, after mid-season larval and pupal phases of their life cycles, by mid-summer flying periods. Numbers have fluctuated, with the poor springs of 2010 and 2012 seeing significantly fewer of these species in both sites, although in both years with some better weather in late summer there was a recovery. Interestingly, the patterns were retained but were shifted forward by about a month in 2012, effectively illustrating the close correlation between populations and environmental factors. The figures for the Small Tortoiseshell in the late summer of the same year hinted at the potential recovery in numbers of a species about which there was widespread concern earlier. This recovery which was clearly evident in 2013. Some further reflections on Vanessid numbers and distribution will be considered later.



Red Admiral M Collins

The Painted Lady has invariably made an appearance in small numbers each year, but nothing to match the vintage invasion year of 2009, when southerly Saharan winds brought this species in from Southern Europe in memorable, if not totally unprecedented, numbers.

Thus far the only Fritillary in the records is the Silver-washed Fritillary, which can regularly be seen in the Gully throughout July and August where it's direct, if slightly swooping, flight pattern makes it fairly distinctive. It favours the Gully, where the mix of woodland, scrub and open grassland and the presence in the scrub of bramble, is to its liking. Rarer sightings on the Downs confirm this habitat preference being centred on sector 1 (Zoo Banks) and Sectors 3 and 4 (the woodland fringe of the Gorge along Circular Road).

The Browns include many meadow species and, as a biological indicator group, these define the coming of summer in the meadow sectors of both sites. As a general rule, for once, it is the Downs, rather than the Gully, which is favoured, albeit often marginally, by this sub-group of the *Satyrids*. Four of the five species in the sub-group, Marbled White, Meadow Brown, Gatekeeper and Ringlet, are common in both sites but have a predictably consistent sequence of first appearance and of duration of persistence through the summer. Earliest to appear has been the Meadow Brown, followed shortly by Ringlet and Marbled White and slightly later by the Gatekeeper. Their season's duration has been up to 12 weeks for the Meadow Brown and up to eight weeks for the other three. As with other butterflies, these seasons have been slightly later, by a week or two, on the Downs compared with the Gully and once again the onset of the whole pattern was delayed by two weeks in 2012. The Small Heath, present in relatively small numbers on the Downs, did not make its first appearance in the Gully until 2013.

The Wall (Brown) makes a regular, if brief appearance on the Downs. The one true woodland species in the community here, the Speckled Wood, is notable, in particular, for the length and apparent continuity of its season. In sectors 10, and 1 and 2 of the Downs transect and in sectors 10 and the wooded parts of sectors 4, 6 and 7 in the Gully, the species can be observed patrolling the dappled spaces for 65%–85% of the April to September Season. Spring and Summer peaks in its population betray its life cycle pattern but, although not traditionally listed amongst the species overwintering as adults, its appearance in April and from the very start of the season in 2010, 2011 and 2012 along Zoo Banks on the Downs could support speculation about the continued accuracy of conventional wisdom.

2013 Counts

Many of the patterns evident, in embryo, in the data for 2010–2012 recurred in 2013. The details of all counts are shown in the four tables below. Note that week 1 starts on April 1, week 13 is the last week in June and week 26 is the last week in September.

Plateau Transect													
Week	1	2	3	4	5	6	7	8	9	10	11	12	13
Small Skipper													
Wood White													
Brimstone									1				
Large White						1	1	2	2	4		1	
Small White						13		13	3			1	
Green-veined White										1			1
Orange Tip						1			3				
Common Blue													
Holly Blue						1		1		2			
Red Admiral													
Painted Lady													
Small Tortoiseshell						2							1
Peacock													
Comma				2									
Silver-washed Fritillary													
Speckled Wood						3	1	1	2	3	5	1	1
Marbled White													
Gatekeeper										1			
Meadow Brown													
Ringlet													1
Small Heath													
Sum	0	0	0	2	0	21	2	17	11	11	5	3	4
Species	0	0	0	1	0	6	2	4	5	5	1	3	4

Table 1. 2013 counts for the Plateau Transects April to June

Plateau transect														
Week	14	15	16	17	18	19	20	21	22	23	24	25	26	sum
Small Skipper			4											4
Wood White		1												1
Brimstone														1
Large White		1	4	16		9	20	17	2	4	5			89
Small White			16	5	29	25	4	14	13	1	2			139
Green-seined White		2	1			2		1						8
Orange Tip														4
Common Blue		7		1		1	2							11
Holly Blue			1		6	2	2	2	2					19
Red Admiral	1	1						1						3
Painted Lady				2				1						3
Small Tortoiseshell	3		2	2										10
Peacock			1		2									3
Comma			4					6	1	1				14
Silver-washed Fritillary						1		2						3
Speckled Wood	15	7	4	1	2	2	8	6	7	5	28		2	104
Marbled White	5	7	9			2								23
Gatekeeper		6	8		2			1		1				19
Meadow Brown	12	1	23	7	4		2	11						60
Ringlet	6	3	55	2	1									68
Small Heath								2						2
sum	42	36	132	36	46	44	38	64	25	12	35	0	2	588
Species	6	10	13	8	7	8	6	12	5	5	3	0	1	

Table 2 Plateau Transect 2013, July to September

Gully Transect													
Week	1	2	3	4	5	6	7	8	9	10	11	12	13
Small Skipper													
Large Skipper													2
Dingy Skipper													
Wood White													
Brimstone	3		1	6	1	4		2					1
Large White						5		2	1	3	1	5	4
Small White					1	5	3	11	7	9		1	4
Green-veined white						2		1		2			
Orange Tip				2	4	13		7	2	4			
Green Hairstreak						2							
Small Copper													
Common Blue									1				
Chalkhill Blue													
Holly Blue													
Red Admiral													
Painted Lady													
Small Tortoiseshell													1
Peacock	2		2	2	4	1	1						
Comma	1		1	1	1	1							2
Silver-washed Fritillary													
Speckled Wood						1			1	6	2	13	6
Marbled White													1
Gatekeeper													
Meadow Brown												1	3
Ringlet													2
Small Heath													
Sum	6	0	4	11	11	34	4	23	12	24	3	20	26
Species	3	0	3	4	5	11	4	7	6	7	2	4	11

Table 3 Gully Transect 2013 April to June

Gully Transect														
Week	14	15	16	17	18	19	20	21	22	23	24	25	26	sum
Small Skipper	1	3	2		3	1								10
Large Skipper		1	2		1	1								7
Dingy Skipper				1										1
Wood White				3										3
Brimstone		1				2	1	1	3					26
Large White		2	9	14	11	12	4	11	12	5		4	1	106
Small White		1	11	26	31	32	16	28	19	28	4	7	8	252
Green-veined white		1		29	14	6		8				3		66
Orange Tip		1												33
Green Hairstreak														2
Small Copper													2	2
Common Blue				7	4		6	10	6					34
Chalkhill Blue			4	6	4	5	1	5	1					26
Holly Blue					1		2					1	1	5
Red Admiral	1	2		1	3							1		8
Painted Lady													1	1
Small Tortoiseshell		4				6	1	1						13
Peacock				12	13	13	2	1		2				55
Comma	2	1	3		5	4	2	4	1					29
Silver-washed Fritillary	3	8	12	2	6	7		3	7					48
Speckled Wood	3	10	9		6	1	1	5	11	14	8	4	3	104
Marbled White	7	27	25	10	1									71
Gatekeeper				1	2	1			1					5
Meadow Brown	4	12	10	15	15	7	2	2		1				72
Ringlet		6	6	4			2							20
Small Heath														0
Sum	21	80	93	131	120	98	40	79	61	50	12	20	16	999
Species	9	18	16	17	17	17	12	17	10	7	3	6	6	

Table 4 Gully transect 2013 July to September

People remember the summer of 2013 as warm and dry but it should not be forgotten that it was not until halfway through June that the temperature reached 20°C for the first time. March was the coldest in Bristol since 1962 and the temperature in April was still close to zero until the 12th so that through the spring there were fears that butterfly recovery from the lows of 2012 was in the balance. It appears that these fears were relatively unfounded over the whole season as shown by Chart 1.

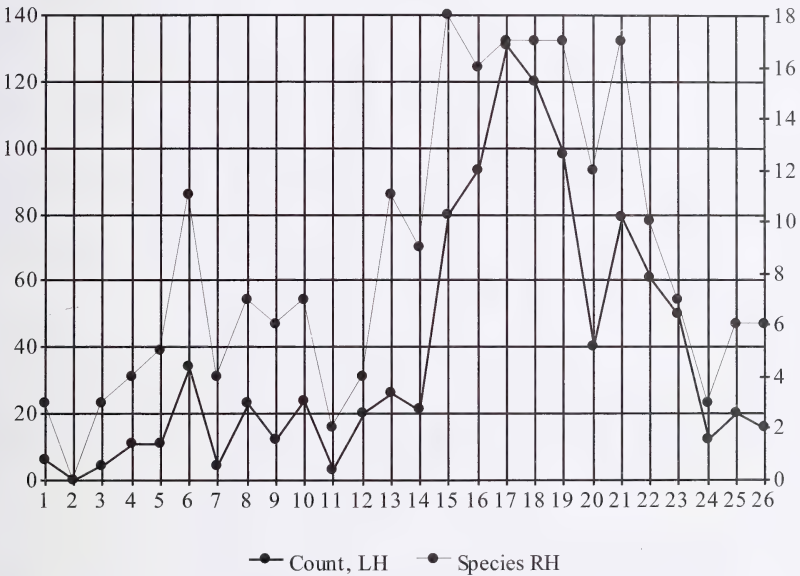


Chart 1 Weekly counts and species totals, both transects 2013

However lower numbers and diversity during April and early May of the species overwintering as adults and of the *Pieridae* were evident, especially in the Downs transect. In the sheltered conditions in the Gully the season began significantly earlier.

The average number of sightings through the season showed significant increases above the average for the previous three years, by 87% on the Downs and by 76% in the Gully. The characteristic spring peak in populations followed by an early summer trough was evident in both transects, with both heights and depths being more pronounced in the Gully. The later, summer peaks, however account for much of the observed population explosion. Counts in excess of 80 were recorded in the Gully for five successive weeks through July and early August and this continued at a slightly lower level (averaging 60) for a further 4 weeks. The patterns were similar, although at a lower peak level, on the Downs. Reproductive success, which this probably reflects, was shared by all five families of butterflies. Pre-eminent in this

respect, much to the chagrin, no doubt, of local "brassicaphiles", were the Large and Small Whites!

The grassland Browns too had a good mid-summer, particularly in the Downs sector 5 wildflower meadow, and sector 9 of the Gully transect. The Speckled Wood maintained its protracted presence through the season, referred to above, although this year they did not first appear until the very end of April.

The Vanessids were noteworthy for a change in distribution, in particular of Peacocks. Following an almost complete removal of *Buddleija davidii* from the Gully (as part of the Gorge management plan), the sightings of Peacocks were almost entirely restricted to sector 5 of the Gully transect, where the introduced "butterfly bush" is still present at the foot of the cliff. This applied too, but less comprehensively to Red Admirals and Small Tortoiseshells, but not to Commas, which retained a presence in the Gully itself. A dense clump of stinging nettles in the same sector may also have had a bearing on its popularity with this group. The group also brought its slightly exotic glamour to the Downs, but in far fewer numbers, accounting for 5.6% of all butterfly sightings here compared to 10.7% of all sightings in the Gully.

Discussion

Data from a mere four years can rarely offer more than a snapshot of a community but, whilst acknowledging this, it does no harm to comment. This is particularly true when data has been collected at a time of habitat management that is new. Indeed it would be short-sighted not to monitor and consider such information. In this context, the following observations are perhaps worthy of discussion.

Impact of management.

For a "city-centre" site, the Downs and Avon Gorge has a diversity of butterfly species which has consistently placed it in the top twenty monitored sites in the Bristol and Somerset region⁹. As such it illustrates the potential of urban green spaces to be green corridors for the UK's often beleaguered wildlife.

In 2001, Asher et Al¹⁰ proposed an ecological classification for butterflies dividing the UK's 59 species into two groups, the habitat specialists and the wider countryside species. What is encouraging in conservation terms is that seven out of 31 of the local species belong to the former group (Dingy Skipper, Wood White, Green Hairstreak, Small Blue, Chalkhill Blue, Adonis Blue and Silver-washed Fritillary). For these species in particular, sensitive and informed management of the site will play a vital part in the conservation of their specialist habitats and thereby aid the survival of a group of insects that, through familiarity, we are in danger of taking for granted.

Amongst these species, two Blues are particularly documented at this site and each has a tale to tell of recent local extinction, but of 21st century recovery. The Small

Blue disappeared from the records in 1957 and was not seen again for almost 50 years, when it was reported in the Gully by Hugh Welford in 2007. It would be premature to claim that the species has re-established itself, but regular sightings have been recorded in very small numbers since that date and efforts have been made to delay the hay-cutting of the site in Sector 5 of the Gully transect where kidney vetch, upon which the larvae depend, is well established.

Rather less dramatic has been the more recent history of the Chalkhill Blue, which disappeared in 1991 not to reappear until 2007. In this case the prognosis for recovery is better with healthy numbers being recorded each summer since 2010 and, once again the presence of the larval food plant (this time horseshoe vetch) is likely to have contributed to its success. The high solar radiation received by the scree slope in Sector 7 of the Gully transect, and its ability to absorb heat and thus generate the high temperatures which the species favours¹¹ is also a factor matching well with it being the more precise location of the majority of sightings of this species. The possible presence of the ant species associated with Chalkhill Blues has not as yet been investigated at this site.

Such close associations between organisms, which is both the life-blood, but also the fragility, of ecological balance illustrate once again the importance for butterfly conservation of the decision in 1988, at the behest of the Avon Wildlife Trust, to introduce a hay mowing management regime instead of amenity grassland mowing to these selected areas of the Downs. Not only has it ensured the survival of a rare calcareous meadow habitat and its flora, but along with the butterflies it has benefitted a significant number and variety of other invertebrate species.

The issue of habitat management brings into focus the imaginative conservation project, now in its third year, to introduce a small herd of feral Kashmiri goats into the enclosed Gully. Its purpose was to interrupt and reverse the process of succession by which, since the cessation of sheep grazing in 1925, the calcareous meadow in the Gully has been gradually encroached upon by scrub, and subsequently by trees, to progress towards becoming sub-climax woodland. The Gully, as a part of the Avon Gorge, is home to a significant number of rare and threatened plant species and the prime purpose of goat-browsing management is to protect and conserve these plants and that its effect on the butterfly community is of secondary importance.

An assessment of the success or otherwise of this experiment awaits the publication of a thorough survey of the flora of the Gully. Apart from a tendency to nibble the bark from unprotected specimens of rare Whitebeams, it is generally acknowledged that the goats are making steady progress with controlling the woody scrub and tree species. However, one possible impact of the experiment on the butterflies here, has been the apparent redistribution of species of *Vanessids* away from all but Sector 5 of the transect with the active removal of *Buddleija* from the fenced area of the Gully.

It should be noted that a similar decline in the populations of both Comma and Silver-washed Fritillary could result from the gradual, but seemingly inexorable, disappearance of the bramble from the site. Both of these species appear to favour the bramble flower as their preferred source of nectar. 2014 is the first year that has seen an almost complete absence of bramble in flower by June 20th so the start of the Silver-washed Fritillary season and the appearance of the new brood of commas, expected in the next week or two, are awaited with some trepidation!

There is now little doubt that climate change is a fact of ecological life irrespective of who or what is responsible for it. This is not a debate that will be rehearsed here. However Chart 2 highlights the close correlation between populations and temperature in our data for 2013 and indicates a need to recognise that evidence exists for alterations in phenology, range and ecology of butterflies in response to climate change. A summary of some of the literature relating to effects on population size, range margins, life cycles and habitat changes makes clear, via field studies and computer-modelling, the extent to which butterflies have been impacted by climate change¹². In the context of their sensitivity to climate, butterflies can be considered a useful indicator group for the study and assessment of change.

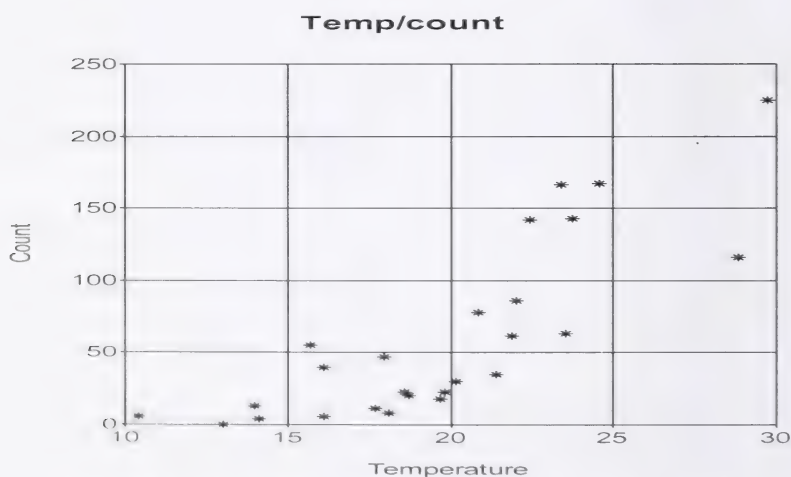


Chart 2 Correlation between temperature and counts in 2013

The database upon which both assessments of the current state of health of the local environment, its butterflies and predictive modelling studies of possible future trends depend is something to which amateur monitoring makes a valuable contribution. UKBMS is keen to increase its coverage of sites in the UK and provides excellent support to organisations like FOD+ AG, as well as to individuals who wish to become involved.

A footnote: As a result of successful links with the University of Bristol Botanic Garden, FOD+AG was invited by the curator, Nichols Wray, to monitor the butterflies on its site on the edge of the Downs. This is a teaching Garden with research and conservation interests and includes areas modelling habitats of SW England as well as collections illustrating pollination, taxonomy and evolution, plants of Mediterranean climatic regions, Chinese and Western herbs and nursery plots. As such it is an artificial construct but one to which it was considered possible to apply the transect monitoring used elsewhere. Initial monitoring this year (2014) has been notable for one feature in particular. Of the relatively few butterflies so far recorded, the overwhelming majority have been made in the 2 out of 10 sectors devoted to natural habitats – the woodland and limestone hills, cliffs, gorges and wildflower meadow areas. It may highlight the fact that whilst bees are attracted to a wide variety of garden plants, to attract butterflies it is essential to plant areas of *wild* flowers.

Finally I would like to acknowledge and pay tribute to the team of volunteers who have diligently collected the data reported here: Timothy Dowling, Robin Haward, Marilyn Holme, Roger Holman, Jeff Hurran, Caroline and Michael Baker and Carola Catleugh.

References / Websites

1. The United Kingdom Butterfly Monitoring Scheme (UKBMS) www.ukbms.org
2. Bristol City Council (BCC) – A Management Plan for the Bristol Side of the Avon Gorge (2010 – 2015) www.bristol.gov.uk/sites
3. Bland, R. Annual weather reports.
4. Friends of the Downs and Avon Gorge (FOD+AG) www.fodag.org
5. Chinery, M. Collins Complete Guide to British Insects p.28 & pp.140-155
6. Skelton, M. (2003) “The Clouded Yellow in Bournemouth 1998-2003” Hampshire and Isle of Wight Butterfly Report 2003 pp. 15-18.
7. Barnett, R. Higgins, R. Moulin, T. Wiltshire, C et Al. (2003) Butterflies of the Bristol Region p.92 Bristol Regional Environmental Records Centre (BRERC)
8. Welford, H. (2007) Nature in Avon - Volume 67 p68. Taylor Thorne Print Ltd.
9. Transects 2010, 2011, 2012, 2013 Somerset and Bristol Butterfly Conservation Somerset and Bristol Branch www.somerset-butterflies.org.uk
10. Asher, J. Warren, M. Fox, R. Harding, P. Jeffcoate, G. Jeffcoate, S. (2001) The Millennium Atlas of Butterflies in Britain and Ireland OUP Oxford.
11. Barnett, R. Higgins, R. Moulin, T. Wiltshire et Al. (2003) Butterflies of the Bristol Region p. 115-117 BRERC.
12. Fox, R. Asher J. Brereton, T Roy, D. Warren, M. (2006) The State of Butterflies in Britain and Ireland pp. 94-95 Pisces Publications.

A preliminary summary of the Spiders of the Downs.

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Abstract

A list of the currently known spider species of the Avon Gorge & Downs (ST5674) is presented with notes on habitat use and identification. Ideas for further study on are discussed with reference to the schedule of meadow mowing

Introduction

To date there has been little recording focussing specifically on spiders of the Downs and Avon Gorge. This is may be because casual recording using guide books is not possible in the same way as it is for more popular invertebrate groups – although many spiders are brightly coloured, their colours may change depending on age and sex, and also as a result of feeding. Guides that only have space for an illustration of a single individual of one are inadequate for identification at species level. Promoting spider recording to a wider audience is challenging as many species have no accepted common name, and some common names refer to spiders of completely different families (and in some cases not spiders at all, e.g daddy-long-legs). There is also the requirement for microscopic examination of the genitalia for accurate identification of many closely related species

Despite this there are many clues offered to those who do wish to progress with field identification, particularly the spiders' web which can identify the presence of a spider, and can often be used to identify to family, which is a good reason to make records of webs for any specimen collected for examination later. Behaviour is another helpful hint and may be characteristic of the family, such as is the case for jumping spiders. It is useful to have a checklist of species that have already been recorded at any given site and so the following list is intended to help those who take up future spider recording in the area. Help is available - there are many opportunities to explore the Downs with a focus on 'bug hunting' during bioblitz-style events such as those organised by the BNHC and Avon Gorge and Downs Wildlife Project. As well as providing species identification activities to the public, these events have also yielded a larger sample size and several species presented here were discovered during such events in 2014. Along with other invertebrates, the UK spider fauna is in a dynamic state and species' ranges are changing for various reasons. The UK knowledge on current spider distributions is always expanding thanks to the Spider Recording Scheme of the British Arachnological Society, and their associated publications and website. It is therefore not surprising that with a little investigation the chances of finding species new to any particular area are very high (20 of the 39 species presented here are not currently on the BRLRC list for ST5674), but perhaps more importantly the ease of finding up-to-date information on new discoveries, and receiving confirmation of species

identifications online and via willing arachnologists is also better than ever before – now is a great time to start spider hunting!

Methodology and habitats surveyed.

For the purposes of surveying spiders this has been broken down roughly into a.) various meadows of the Downs including long unmown grass, shrub islands and woodland edges, and b.) the Gully which includes shaded woods, steep scree slopes and vegetation being grazed by goats. Spiders were sampled by sweep netting, foliage beating and searching by hand amongst vegetation. Surveying was not regular or systematic but rather occurred whenever opportunity presented itself and also during ‘bug hunting’ events. Spiders were identified with reference to Roberts 1993, Roberts 1996, and species identification updates in Spider Recording Scheme News (SRSN). Where field identification was possible spiders were released and where appropriate voucher material was collected in 70% alcohol and deposited in the collections of Bristol City Museum should future reference be necessary.

Species accounts and observations.

***AGELENIDAE* (Sheet-web spiders)**

***Agelena labyrinthica* (Labyrinth Spider)**

The Labyrinth spider resembles its relative, the house-spider, but has a more elegant appearance with well-defined chevrons on the abdomen. It spins a large funnel-shaped sheet web of thick silk with a tubular retreat where the spider can usually be seen waiting for grasshoppers to land on the web. The webs are made amongst uncut grass in the meadows and higher up in gorse bushes around the gully. This species would benefit from areas of long grass that get left unmown until late in the summer as this is when the female makes a thick cocoon for her eggs (SRS).

***AMAUROBIIDAE* (Lace-weaver spiders)**

***Amaurobius* sp.**

The thick lacy web typical of this family was found over a rotten tree stump in the shady wooded entrance to the Gully, although an individual was not observed. Lace-weaver spiders may occur everywhere there is sufficient shade and damp such as inside the shrub islands and woods surrounding the downs. More investigation is needed to determine which of the *Amaurobius* species live here.

***ARANEIDAE* (Orb-weavers)**

***Araneus diadematus* (Garden Cross Spider)**

Garden spiders can be found throughout the Downs and Gully and are easily recognised by the white cross marking on the abdomen, and individuals and webs becoming larger during the autumn months. They probably benefit from the edges of the shrub islands which provide permanent support for their orb webs and open air for plenty of flying insects.

***Araneus quadratus* (Four Spot Orb-weaver)**

This very attractive spider can be easily distinguished from the Garden Spider by the four small white spots on its abdomen, and more contrastingly striped legs, although there is quite a variation in the overall colouration of individuals. This spider occurs in the meadows where the long grass and shrub islands provide suitable support for the large orb-webs. Unlike the Garden Spider which is common throughout Bristol, the Four-Spot Orb-weaver favours damp grassland and heath vegetation and so the Downs may be an important refuge for this species in Bristol.

***Araniella cucurbitina* / *opistographa* (Cucumber-green spider)**

One of the few UK spiders which is entirely bright green – this spider is often overlooked as it is of medium size and well camouflaged. They are found amongst bushes and trees lining the woods and shrub islands where they spin a horizontal orb-web across the span of a large deciduous leaf. Young spiderlings hatch from their egg sack in summer where they probably descend into the lower vegetation until the following year. More work is needed to find out exactly which of the *Araniella* species occur on the downs, as both *A. cucurbitina* and *A. opistographa* can be found in the same localities (Russell-Smith 2001). A focus on taking samples by beating the foliage of deciduous trees around the Downs may reveal more species from this important habitat type.

***Cyclosa conica* (Trash-line spider)**

This distinctive orb-weaver has a deformed cone shaped abdomen, and also spins a characteristic web which it decorates across the middle with the remains of insect prey amongst which it is well camouflaged. Recently spotted near the circular road (Brown & Drewitt, 2014), it is said to prefer damp and shady locations including evergreen trees (SRS).

***Zygiella atrica* (Red-sided Sector Spider)**

Unlike its domestic cousin the Window Spider (*Z. x-notata*), *Z. atrica* avoids man-made structures such as buildings. Although very similar on shape and pattern, *Z. atrica* has red colouration either side of its abdomen. It prefers natural habitats with sufficient vegetation structure to support its characteristic missing sector orb-web. This is another example of two similar species each preferring man-made or natural habitats. *Z. atrica* was spotted in the Gully by Andy Pym and it has not yet been recorded on the Downs or any other central Bristol green space.

ATYPIDAE

***Atypus affinis* (Purse-web spider)**

This unmistakable spider has tarantula-like fangs and lives exclusively inside a silken tube, which is so well camouflaged and buried that finding one without active searching is highly unlikely. After an empty purse web was discovered in 2012 (Pajak 2012), further excavation in 2013 revealed several purse webs of varying sizes and one live individual. So far they have only been found in one small, steep and inaccessible area of the gully. It is clear that this unique habitat of loose soil and supporting vegetation around the Avon Gorge is vital for the species in Bristol, which has only been recorded elsewhere in the region from Steep Holm Island. This species has been observed to disperse as spiderlings by ballooning (Harvey 2013) so it is possible that populations may occur elsewhere in the region wherever there is suitable soil for excavating.

DYSDERIDAE

***Dysdera erythrina* (Woodlouse-eating Spider)**

The orange-red body colour and grey abdomen are characteristic of Woodlouse-eating spiders, which use their wide fangs to feed exclusively on woodlice. This spider is found under stones in the scree slopes of the gully where it makes a silken chamber to protect it from the elements. It is interesting that just nearby in Clifton its larger and more synanthropic cousin, *D. crocata* is common. The Gully may be an important habitat for *D. erythrina* which does not seem to tolerate disturbed habitats and is unlikely to be found in gardens (Harvey 2009).

GNAPHOSIDAE (Mouse spiders)

***Drassodes* sp (Stone spider)**

These large mouse-grey spiders can be found sealed within a silken chamber under stones where both males and females may occupy the same chamber (SRS). The scree slopes of the Gully provide the habitat which these spiders are associated with and more work is needed to see which of *D. cupreus* or *D. lapidosus* occur there.

CLUBIONIDAE (Sac spiders)

Clubiona reclusa

This species was found during sweep-netting of uncut meadows on the Downs. Sac spiders do not use web to catch their prey, but females curl up vegetation to make a cocoon using silk to protect their eggs. Timing of meadow mowing may be an important factor in the survival of the species from year to year.

LYCOSIDAE (wolf spiders)

***Pardosa* sp.**

Wolf spiders can be seen in large numbers running across the scree slopes of the gully which provide a warm surface for sunbathing insects upon which they prey. Females can be seen carrying large white egg sacs in spring and again in summer when the young hatch to climb onto their mothers back for a week before dispersing. Although these dark and fast spiders are easy to recognise as wolf spiders, identifying them to species level is tricky and further investigation is needed to find out which of the 13 British *Pardosa* spp the Downs and Avon Gorge have to offer.

***Trochosa ruricola* (Rustic Wolf Spider)**

This large brown spider can be found hiding under warm stones around the scree slopes of the Gully. The arrangement of the eyes distinguish it from the more common wolf spiders.

LINYPHIIDAE (Money spiders)

***Bathyphanes* sp**

A very small species of grey money spider collected by sweep netting in grass. Although widespread and very common (Russell-Smith 2011) more work needed to investigate which of the 5 British species there are on the Downs.

***Porrhomma* sp.**

A very small species of money spider collected by sweep netting in grass. More work is needed to investigate which of the 10 British species there are – however this requires dissection of the female epigyne and comparison with verified reference material (Russell-Smith 2009)

***Walckenaeria* sp.**

A very small species of money spider collected by sweep netting in grass. More work is needed to investigate which of the 21 British species there are on the Downs.

Erigone atra* & *Erigone dentipalpis

These miniscule black spiders occur everywhere and as adults they take to the air on lines of silk, often landing on people. Identification of males is based on the ornate horns protruding from their palpal tibiae.

Linyphia triangularis

This spider is most noticeable for hanging upside down in the middle of a sheet web which it constructs beneath a tent of vertical threads for displacing flying insects. Males and females can occupy the same web, which is built at varying heights off the ground in suitable vegetation. It is also found in gardens and probably occurs in all of the shrub islands of the Downs, however there are many similar species of Linyphiid such as (*Nerienne sp.*) which may be overlooked.

Lepthyphantes tenuis

A very small species of money spider collected by sweep netting in grass. This spider occurs in a variety of habitats including indoors where it spins a very fine sheet web from which it hangs upside down.

PISAURIDAE

***Pisaura mirabilis* (Nursery Web Spider)**

This large and handsome spider can be found amongst the long grass in the Gully where females may be seen carrying a large ball of eggs with their chelicerae. They are often seen outstretched on a leaf with the first pairs of legs resting together in a characteristic pose. Females construct a large nest of silk amongst tall grass to protect their eggs. Any long grass areas left uncut around the shrub islands of the Downs may be a useful refuge for populations outside of the Gully.

SALTICIDAE (Jumping spiders)

Heliophanus cupreus* & *Heliophanus flavipes

Females of these small black jumping spiders have quite strikingly coloured yellow-green palps and white markings, whereas males are all black. They can be found hunting on sunny days on vegetation around the scree slopes of the Gully. Separation of the species is based on the arrangement of black marking on their otherwise yellow legs.

Sitticus pubescens

This jumping spider is usually found associated with human buildings and walls (SRS), last recorded in the area 2009 (BRERC).

Euophrys frontalis

Although very small this is a charismatic jumping spider showing sexual dimorphism with males having bright orange colouration around the eyes and black iridescent legs. Females have a striped abdominal pattern of light and dark brown. This is another jumping spider found hunting on the sunny slopes of the Gully.

Evarcha falcata

This jumping spider is large compared to the others and has striking white, black and orange bands around the thorax and abdomen, also found on the scree slopes of the Gully and easy to spot due to its large size.

TETRAGNATHIDAE (Long-jawed orb-weavers)

Metellina segmentata

These very common spiders can be found in shaded areas such as the woods around the entrance to the Gully, and the understory of the shrub islands where they spin large orb-webs. They have attractive and variably patterned abdomens and relatively long and spiny front legs, however the colour is quite variable and cannot be used to separate the species. Care is needed to distinguish between *M.segmentata* and *M.mengei* which occurs in similar habitats and may also be found with further investigation (SRS).

Tetragnatha extensa* & *Tetragnatha montana

These large spiders with and elongated bodies spin webs amongst long grass where males and females may reside in close proximity. Although very similar, the two species currently recorded from the Avon Gorge and Downs can be distinguished by examining the underside of the sternum, which has a light mark in *T. extensa*. *T.extensa* is said to be more closely associated with wetland habitats than *T.montana* but can be found in a variety of other habitats including grasslands (Russell-Smith 2011), and further work is needed to find out which areas of the Downs and Gully each species prefers, and whether any other *Tetragnatha* species occur in the area.

THERIDIIDAE (Comb-footed spiders)

Episinus angulatus

This distinctive spider has an inverted wedge shaped abdomen and spins a simple web of a few threads which it holds centrally in an H-formation. Although common and widespread (SRS) it is not often recorded – a single specimen was found in the Gully.

Episinus truncatus

Two immature specimens were collected from the ground amongst vegetation near the scree slopes of the Gully, and were reared to adulthood and sent to Peter Harvey of the British Arachnological Society for verification – *E.truncatus* (nationally scarce) differs from the *E.angulatus* in having darkened legs and is associated with maritime grasslands and heathlands, only recorded elsewhere in the region on Steep Holm (BRERC).

Theridion impressum

A single female specimen was found sweeping the unmown meadow near the path to the Zoo and a male amongst long grass next to Circular road bordering the northern edge of the Gully. The shiny globular abdomen of the female is strikingly marked in black and brown with thin white transverse stripes. The male was unlike the female in general appearance and resembled a small orb weaver with elongated front legs – however with microscopic examination the palp was unmistakable. This species constructs a retreat decorated with plant material amongst bushes on open ground, and is said to be less common than the very similar *T. sisyphium* which can be found in the same habitat (SRS) and might also occur on the Downs.

Achaearanea lunata

A single specimen was found in a tangle web on the bars of the kissing gate to the entrance of the gully, at about head height. The specimen has an overall red colouration with distinct diagonal white stripes and a vertically elongated abdomen. This species is uncommon in the region (Roberts 1996) and is often found higher up in bushes in shaded habitats, and on fences (SRS)

Enoplognatha sp (Candy-stripe spider)

This very common spider is found in large numbers whilst sweeping long grass around the Downs and Gully. Individuals of various colour-morphs of green and pink are often found together. Further investigation is required to resolve which of *E.ovata* and *E.latimana* occur in the downs and Gully as they can only be separated by microscopic examination and both have been found together in grassland with isolated or sparse clumps of taller plants (Askins 2004).

Pholcomma gibbum

This small brown species could easily be confused with a money spider without microscopic examination, however the eye arrangement are characteristic. A single specimen was found amongst long grass on the downs during a bug hunting event organised by the Avon Gorge and Downs Wildlife Project .

THOMISIDAE (Crab Spiders)

Diaea dorsata

This green crab spider was last recorded in the area in 2010 (BRERC)

***Misumena vatia* (Flower Crab Spider)**

A large and very attractive crab spider with the ability to change colour depending on its choice of background (Defrize et al 2011). This spider is found sitting in the middle of a flower where it waits to capture visiting insects including bees. An Immature specimen was found in the Gully in August. This is a good candidate for promoting spider recording to a wider audience for its unique appearance and well documented life-history (see Morse 2007).

Xysticus cristatus

One of the most common crab spiders, occurring in many habitats (SRS) and can be found by sweep netting through the grassy meadows where it hunts a variety of insects. They can be quite variable in colour.

***Philodromus rufus* (cf. *albidus*)**

A single specimen was collected by sweep netting through long grass in-between Circular road and the northern edge of the Gully. Under microscopic examination the specimen is consistent with *P. rufus* (illustrations in the appendix of Roberts 1993) however this would be a new spider to the currently accepted British Checklist (i.e. new to the UK) and so verification of the specimen will be required before this can be claimed. It may be more likely that it is an aberrant *P. albidus* whose range is increasing in southern England, although there remains the possibility to find *P. rufus* in suitable coastal habitats in Southern England (SRS).

Family	Species	Gully	Meadow	Habitat
AGELENIDAE	<i>Agelena labyrinthica</i> *	x	x	gorse
AMOUBIDAE	<i>Amaurobius</i> sp *	x		tree stump
ARANEIDAE	<i>Araneus diadematus</i>	x	x	
ARANEIDAE	<i>Araneus quadratus</i>		x	
ARANEIDAE	<i>Araniella cucurbitina sensu lato</i>			tree foliage
ARANEIDAE	<i>Cyclosa conica</i>			near peregrine watch
ARANEIDAE	<i>Zygiella atrica</i> *	x		
ATYPIDAE	<i>Arypus affinis</i>	x		steep slopes
CLUBIONIDAE	<i>Clubiona reclusa</i> *		x	
DYSDERIDAE	<i>Dysdera erythrina</i>	x		under rocks
GNAPHOSIDAE	<i>Drassodes</i> sp *	x		under rocks
LYCOSIDAE	<i>Pardosa</i> sp.	x		scree slopes
LYCOSIDAE	<i>Trochosa ruricola</i> *	x		under rocks
LYNIPHIIDAE	<i>Linyphia triangularis</i>			tree foliage
LYNIPHIIDAE	<i>Erigone atra</i> *		x	
LYNIPHIIDAE	<i>Erigone dentipalpis</i> *		x	
LYNIPHIIDAE	<i>Walckenaeria</i> sp. *		x	
LYNIPHIIDAE	<i>Porrhomma</i> sp *		x	
LYNIPHIIDAE	<i>Bathypantes</i> *		x	
LYNIPHIIDAE	<i>Lepthyphantes tenuis</i> *		x	
PISAUDIDAE	<i>Pisaura mirabilis</i>	x		
SALTICIDAE	<i>Heliophanus cupreus</i>	x		scree slopes
SALTICIDAE	<i>Heliophanus flavipes</i>	x		scree slopes
SALTICIDAE	<i>Sitticus pubescens</i>	x		scree slopes
SALTICIDAE	<i>Evarcha falcata</i> *	x		scree slopes
SALTICIDAE	<i>Euphorys frontalis</i> *	x		scree slopes
TETRAGNATHIDAE	<i>Metellina segmentata</i>	x		shaded woodland
TETRAGNATHIDAE	<i>Tetragnatha extensa</i>		x	
TETRAGNATHIDAE	<i>Tetragnatha montana</i>	x		
THERIDIIDAE	<i>Theridion impressum</i> *		x	
THERIDIIDAE	<i>Pholcomma gibbum</i> *		x	
THERIDIIDAE	<i>Episinus truncatus</i> *	x		
THERIDIIDAE	<i>Episinus angulatus</i> *	x		
THERIDIIDAE	<i>Achaearanea lunata</i> *	x		metal fence in shaded woods
THERIDIIDAE	<i>Enoplognatha (ovata/latimana)</i> *	x	x	
THOMISIDAE	<i>Diaea dorsata</i>			unknown
THOMISIDAE	<i>Misumena vatia</i>	x		
THOMISIDAE	<i>Xysticus cristatus</i>		x	
THOMISIDAE	<i>Philodromus rufus</i> *		x	

TABLE: A list of spider species found in the Avon Gorge and Downs with notes on the habitat in which they are found. * = new to the BRERC list for the area (BRERC 2014).

Discussion

To date no systematic survey has been carried out which could be repeated to give an accurate measure of spider abundance and diversity in the Avon Gorge and Downs. This article lists 38 species in 13 families as a preliminary checklist for future recording however several of these are species pairs for which the exact presence of either is still unknown e.g. *Drassodes cupreus* vs *Drassodes lapidosus*. The current known distributions of spiders listed here range from the ubiquitous (e.g. *Erigone atra*) to 20 new records to the list for (ST5674) provided by the Bristol Regional Environmental Records Centre. This list is probably more biased to collection by sweep-netting and casual observation rather than what may be found using other techniques such as pitfall traps. Entire spider families have probably been omitted due to their secretive nature e.g. Hahniidae, or small size e.g. Dictynidae.

The mixed range of habitats and land use across the Avon Gorge and Downs presents both challenges and opportunities for a diverse range of spiders. The proximity of the Avon Gorge to the neatly maintained cut grass pitches and tree lines of the Downs is a continuum of contrasting habitats, and this is reflected in the spider species that can be found here. What is clear from the currently presented list is that along with spiders that we would expect to find in any urban green space (e.g. *Araneus diadematus*), there are species which are not tolerant of disturbed habitats (e.g. *Zygiella atrica*). Many species found on the Downs are grassland and heath species which require a habitat structure sufficient for them to support their webs (e.g. *Araneus quadratus*), which are not generally found in gardens or similar urban green spaces and so the grassy meadows of the Downs are an important spider habitat.

Human activity including meadow mowing and recreation are a constant force for change under which spider populations must exist, adapt or perish. What is not yet clear is how the mowing of the long grass meadows is affecting populations, although species found today must have survived as a result of previous mowing, for better or worse. With such little idea of abundance it is impossible to say what effect changes to these areas might cause, other than to say that invertebrate numbers are almost certainly drastically reduced once the grass is cut. Any long grass remaining uncut in meadows and borders of the shrub islands must play a key role in sustaining adult females and their offspring to repopulate the open areas in the following year. Although many spiders disperse long distances when young, adult females may remain protecting their eggs until they die and do not travel, and so the exact timings of meadow mowing could be an important factor in how well a species fares from year to year.

The steep vegetation of the Gully is particularly rich in unusual spiders including scarce species such as *Atypus affinis* and *Episinus truncatus* (Both only found

elsewhere in the region on Steep Holm). As habitat compression is a driving cause for spider rarity (Duffey & Feest 2009) the Gully may be of vital importance to the presence of these species in the region, as dispersal between similar habitats may be impossible or unlikely. As well as being good habitat, the Gully is also a great place to watch spider behaviour, especially on a warm day when the scree slopes are alive with jumping spiders and wolf spiders.

The shrub islands and woodland bordering the Gully and the Downs provide shade and structure for common orb-weavers (*Metellina* spp.) and money spiders (*Linyphia triangularis*), but also more unusual species such as the red Theridion yet to be identified. With this shade comes damp and decaying material with its own spider fauna such as Laceweavers and minute species yet to be properly investigated. The tree canopy and foliage of deciduous trees also has an associated spider fauna and could be a useful habitat for targeted sampling (Russel Smith 20012).

Omitted from this article are the synanthropic species also recorded from nearby homes (see Pajak 2012) which might be found amongst the various fences, buildings and bus stops that bisect the downs, and which are a reminder that many spider species have adapted to and are prospering from human activity. Even in the wooded areas surrounding the Gully a metal fence provides habitat for spiders happy to adapt to human intervention (e.g. *Achaearanea lunata*).

The Avon Gorge and Downs is a place where cosmopolitan spider species intermingle with their rustic brethren, and this makes it a place to be celebrated for its unique diversity of spider species. As pressure from human land use no doubt restricts some species to the Gully and its perimeter, it is important for us to progress with identifying which species venture out into the long grass meadows and shrub islands, and to find out exactly when their egg sacs mature. Targeted sampling of specific habitat types across the downs will no doubt add more species to the list and hopefully increase interest in the area for spider hunters.

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REFERENCES

- Askins 2004: *Enoplognatha latimana* in Wiltshire. Spider Recording Scheme News No 49.
- Duffey, E. & Feest, A. 2009: A comparative ecological study of the spider (Araneae) faunas of East Anglian fens, England: regional differences and conservation. Bull. Br. Arachnol. Soc. 2009 vol 14(8) 317-333.
- Drewitt, E. & Brown, J. 2014: Unusual species of Spider found on Bristol Downs. University of Bristol School of Biological Sciences News website <http://www.bristol.ac.uk/biology/news/2014/300.html>
- Harvey, P. 2009: Identification of *Dysdera crocata* and *Dysdera erythrina*. Spider Recording Scheme Newsletter 63 in Newsl Br. Arachnol Soc 114
- Harvey, P. 2013: Notes on *Atypus affinis* in a Hampshire Harden. Spider Recording Scheme Newsletter 76 in Newsl Br. Arachnol Soc 127
- Morse, D. 2007: Predator Upon a Flower - Life History and Fitness in a Crab Spider. Harvard 2007. ISBN 0-674-02480-X or 978-0-674-02480-9
- Pajak, M. 2012: Silken Sunken Sock Sports Strange Spider Skin. Bristol Naturalists News November 2012
- Roberts, M. 1993 The Spiders of Great Britain and Ireland Compact 2-part edition. Published by Harley Books
- Roberts, M. 1996 Spiders of Britain and Northern Europe. Collins field guide
- Russell-Smith, A. 2001: A further record of *Pistius truncatus* from Blean Woods, Kent. Spider Recording Scheme Newsletter 41
- Russell-Smith, A. 2009: Identification of *Porrhomma* species. Spider Recording Scheme Newsletter 63 in Newsl Br. Arachnol Soc 114
- Russell-Smith, A. 2011: Identification of *Tetragnatha extensa* and *Tetragnatha pinicola* Spider Recording Scheme Newsletter 70 in Newsl Br. Arachnol Soc 121
- Russell-Smith, A. 2011: Identification of *Bathyphantes gracilis* and *Bathyphantes parvulus*. Spider Recording Scheme Newsletter in Newsl Br. Arachnol Soc 121
- Defrize, J. Lazzari, C. Warrant, E. & Casas, J. 2011: Spectral sensitivity of a colour changing spider. Journal of Insect Physiology 2011

Websites

- SRS: Spider Recording Scheme Website: <http://srs.britishspiders.org.uk/>
- SRSN: Spider Recording Scheme Newsletter available online at <http://srs.britishspiders.org.uk>
- BRERC: Bristol Regional Environmental Records Centre online interactive maps: <http://www.brerc.org.uk/>

A note on the trees of the avenues on the Downs.

Richard Bland

Much has been written about the plants of the Downs, especially the rare ones, but little about the trees. It is probable that in remote antiquity the surface of the Downs plateau was as tree-clad as the surface of the Leigh Woods plateau. It is quite unclear when the tree cover was removed, but the existence of traces of bronze-age fields on the Downs, as well as the iron-age Clifton Camp, which dominates the local landscape, and whose significant strategic value at that time must have depended on all round visibility, suggest that trees disappeared a very long time ago. The fact that the Anglo Saxon parish boundary was defined in 877 by the merestones, that still exist today, implies that the site was already grazed common land. However today the surface of the Downs contains both veteran self-sown native trees and formal avenues along the major routes. This note examines the history of avenue planting. The 1746 Wilstar map makes it clear that there were already avenues defining the Westbury Road, the Stoke Road from Blackboy and the Old Stoke Road which ran direct from Fountains Hill to the Old Halt by the present Stoke Road traffic lights, and these avenues still exist. They were presumably planted to ensure that travellers did not get lost at night, in fog, or in snow. They form a palimpsest of tree planting policy down the years.

The oldest avenue that we know existed was created by the first Downs Conservator, appointed in 1766, Sir William Draper, of Manilla Hall, and a military hero who had just returned from conquering the Phillipine Islands for Britain. He built an avenue from the top of the Clifton Camp, where a windmill had just been erected, across the otherwise bare Clifton Green to his own front door. It still existed on the Donne map of 1821 but the oldest tree today on the Green is a Horse Chestnut dating from c 1850.

It is not certain what species was used for the early avenues but it is probable that Limes were used, as they are the oldest trees on the Downs. There is a Common Lime that is part of the Westbury Road avenue with a girth of 4.00m, which implies that it is 200 years old. The evidence for this is that the limes round Clifton College are known to be 150 years old, and have a maximum girth of 3.00m. There are also two Large-leaf Limes on the path leading from the Westbury Road to Westfield Park that have a girth of 4.8m suggesting that they could date from 1770. The oldest extant Lime avenue in Bristol is that leading up to Kings Weston House, with girths of around 5.0m, which may well date back to 1720.

The next planting was of the Horse Chestnuts along Westbury Park Road. These trees have a girth of around 4.1m, and several have died in recent years. They were planted

in around 1860, and are faster growing than the Limes. The Chestnut trees on Savile Road, which was built in 1877, have a girth of 3.9m.

Ladies Mile, which had been built in 1820, has two Common Limes with girths of 3.0m, which would date them to 1860. In 1872 there was a massive planting of Huntingdon Elms along the whole of Ladies Mile and all along the Old Stoke Road, Downleaze, and along the upper end of Upper Belgrave Road. The Huntingdon Elm was a female Wych Elm clone developed by the trade for its fine form, and on the city's "Know your place" website they can be seen in an aerial photograph taken in December 1946. By that time they were all magnificent trees in their prime. Dutch Elm Disease from 1975 destroyed them all but one, still alive at the west end of Ladies Mile.

The replacement for the Huntingdon Elms were native Small-leaved Limes, but also Large-leaved Limes and Silver Leaf Limes, which were planted along Ladies Mile, and along the southern section of Circular Road which had not previously had an avenue, and along Downleaze.

The Old Stoke Road was planted with Beeches. Almost all these young trees, now thirty years old or so have grown very well and have girths of around 1.5m. However there are one or two much older trees on the Old Stoke Road. There is an ancient Ash at the point where the road crosses the parish boundary, which has a girth of 3.5m, suggesting it was already there when the Elms were planted in 1872, and two ancient Common Limes with girths of 2.4m which suggests the same thing. There are also three very unusual Black Walnuts, a North American species with girths of around 2.0m, implying planting perhaps in 1950 perhaps as replacements for Huntingdon elms that had been damaged.

The Stoke Road avenue consists of alternate Horse Chestnuts and Small-leaved Limes with girths of around 2.0m, implying they were probably planted either just before or just after the Second World war. The Chestnuts in particular are not very happy specimens. The trees at the southern end, around the water tower are Common Limes with a girth of 2.5m which probably date from an earlier planting around 1910.

The Westbury Road avenue also consists of alternate Chestnuts and Common Limes, but their girth is around 2.4m, implying a planting date of around 1920. But some of the limes are older, dating back to the mid-19th century or earlier. This variation in size implies a consistent policy replacing dead or damaged trees with the same species over a very long period of time.

An avenue along the Promenade first appears on the Ashmead map of 1849 and it was probably created in the 1820s. An early photo suggests they were elms. They were replaced by the present Beech avenue from around 1900. The earliest maps suggest a single avenue but this was expanded to a double one a century ago and perhaps there was an intention to emulate Rotten Row in London as the Promenade would have included riders. Since 1950 the avenue has been extended so that it now runs right up to the Clifton Camp, and the very varying girths of the trees indicate successive efforts to get plants established. There was apparently extensive bomb damage to the area by the Lord Mayor's House, and some of the trees have bark damage that may be a consequence.



The Promenade, autumn R Bland

BRISTOL & DISTRICT INVERTEBRATE REPORT, 2013

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INTRODUCTION

2013 was an interesting year. A cold winter led into a long cold spring which was followed by a hot summer. Consequently numbers of insects were depressed initially but things improved markedly in the summer assisted by immigration of white butterflies and by certain moth species from the continent, though by all means not all the usual suspects. Silver Y and Rush Veneer moth numbers were low as was Clouded Yellow butterfly, for example. Resident species such as Large Yellow Underwing and Green Oak Tortrix moths, usually abundant, were also in low numbers.

Of native species, one notable affect was the abundance of the Antler Moth, a species more often found nectaring by day on grassland plants than at light at night, but which had been becoming noticeably rare recently, until 2013. Other occasional exceptional reports included the sighting of 63 Small Copper butterflies at Kingston Seymour, reported via Maggie Gamble, also Green Hairstreaks were the commonest butterfly on Walton Common when Dave Horlick visited on 1 May, whilst Dave Nevitt reported from Rowberrow Warren on Mendip in July – 'At dusk the number of Scarlet Tigers on the wing had to be seen to be believed. Must have been thousands of them'. A remarkable turn around in the last 20 years of what was previously a very rare species.

Early summer saw the publication of the 'Dragonflies & Damselflies of the Bristol Region', thanks largely to the Bristol Naturalists' Society which was the largest financial sponsor. As seems almost inevitable, soon after publication a new discovery came to light, a specimen of the Vagrant Emperor Dragonfly found in a Hanham garden as reported below; roll on the revised edition.

Responding to a challenge laid down nationally, some local recorders, notably Rupert Higgins and John Martin, managed to record over 1,000 species of animal and plant in their local patch. To achieve such a feat required a contribution of many invertebrate records of course. It is certainly a way to get yourself to look at species you would normally ignore and also a way for common species to be reported to recording schemes which otherwise would not get a mention! Similarly, Chris Iles, by concentrating on recording leaf mines of Lepidoptera, has revealed how common

some species are but which are very poorly represented in the recording schemes and local record centre databases. There is, as always, much scope to discover more about our local invertebrate populations and perhaps illustrated best by the record below of the Moringa Budworm moth, this annual report usually lists species new or of rarity in the region, it is rewarding to be able to report in this instance of a species new to the British Isles.

Scientific nomenclature follows that used by the National Biodiversity Network website (www.nbn.org.uk).

My thanks to all who have submitted records directly to the Society, particularly to Jon Martin, Andy Pym, John Martin, Nigel Milbourne, Alan Bone, John Aldridge, Bob Fleetwood, Michelle Fowler, Jean Oliver, Dave Nevitt, Chris Iles, Darrel Watts, Tony Smith, Mark Pajak, Tony Cotterell, John Burton, Marcus Rhodes, Paul Bowyer, Neale Jordan-Mellersh, Jean Oliver, Jean Hathaway, Richard Pooley, Martin Evans, Des Bowring, Rich Andrews, Mike Bailey, Margaret & Jim Webster, Jackie Edwards, Dave Gibbs, Ian Stapp, Lois Pryce, Sue Sayers, Ray Cottrell, the Bristol Regional Environmental Records Centre (BRERC), members of the Clevedon Moth Group, Bristol & District Moth Group and the Bristol Wildlife E-group. The importance of receiving, not just the records picked out here, but those of perhaps less noteworthy species cannot be understated in terms of monitoring the ever changing status of the invertebrate fauna.

Species of note in 2013

INSECTA

Collembola (springtails)

Vertagopus arboreus (L.) Pilning, South Gloucestershire ST55 85 (vice county 34) 28 March 2013 John Martin, in moss. Springtails are rarely recorded in the region.

Psocoptera (barkflies)

Valenzuela flavidus (Stephens) Littlewood, North Somerset ST438 683 (vice county 6) 21 July 2013 Mark Pajak (conf. Keith Alexander). An extremely poorly recorded group of insects.

Psococerastis gibbosa (Sulzer) Littlewood, North Somerset ST438 683 (vice county 6) 21 July 2013 Mark Pajak (conf. Keith Alexander). An extremely poorly recorded group of insects.

Mesopsocus immunis (Steph.) Weston Farm Lane, Bath & NE Somerset ST 731 669 (vice county 6) 24 June 2014 Jon Martin (det. Joe Botting). An extremely poorly recorded group of insects.

Odonata (damselflies and dragonflies)

Vagrant Emperor *Hemianax ephippiger* (Burm.) Hanham, South Gloucestershire ST64 73 (vice county 34) 25 October 2013 Rob Laughton. A first for the Bristol region of this migrant species.

Scarce Blue-tailed Damselfly *Ischnura pumilio* (Charp.) Western Approach Distribution Park, Severn Beach, South Gloucestershire ST556 831 (vice county 34) 26 June 2013 John Martin, Pam Taylor & Ingrid Twissell. Confirmed at one of its very few local sites.

Red-veined Darter *Sympetrum fonscolombeii* (Selys) New Passage, South Gloucestershire ST550 865 (vice county 34) 23 July 2013 John Martin, one worn male. Not a good year for this immigrant species.

Hemiptera (true bugs)

Western Conifer Seed Bug *Leptoglossus occidentalis* Heide. St. Andrews Park, Bristol ST593 751 (vice county 34) 14 July 2014 Jon Mortin (det. Richard Jones), one larva. Since its arrival in the region in 2009 the number of records of this species seems to have dropped.

Spruce Cone Bug *Gastrodes abietum* Bergroth Pilning, South Gloucestershire ST55 85 (vice county 34) 5 March 2013 John Martin, one on back door, possibly came to light? Few records locally.

Ledra aurita (L.) Stokeleigh Camp, Leigh Woods, North Somerset ST558 732 (vice county 6) 6 August 2013 Ray Barnett, 1 beaten from oak, a seldom seen species in the region.

Lepidoptera (butterflies)

Swallowtail *Papilio machaon* L. North Somerset (vice county 6) 25 August 2013 'Revd. Richard' one larva found in garden. This report appeared on the *NaturePlus* part of the Natural History Museum, London website. The larva had been found pupating next to a bed of Fennel and had pupated fully by 27 August emerging as the adult on 22 September. Possibly the progeny of an immigrant example or alternatively from a released captive bred example, either way quite a surprise for the garden owner.

Clouded Yellow *Colias croceus* (Geoff.) Weston Moor, Gordano Valley, North Somerset ST4 7 (vice county 6) 1 August 2013 Sue Sayers, 3 seen. Sand Bay, North Somerset ST33 65 (vice county 6) 20 August 2013 Paul Bowyer. Winscombe, North Somerset ST4 5 (vice county 6) Lois Pryce 3 September 2013. Sea Mills, Bristol ST5 7 (vice county 34) Sunday before 3 Sept 2013 Des Bowring. Not a good year, just a sprinkling of records.

Lepidoptera (micro-moths)

Biselatichista scirpi (St.). Sand Bay, Weston-super-Mare, North Somerset ST331 651 (vice county 6) 19 July 2013 Paul Bowyer, one netted. First record for the region.

Phyllonorycter stettinensis (Nic.) Sand Bay, Weston-super-Mare, North Somerset ST331 651 (vice county 6) 1 June 2013 Paul Bowyer. Combe Hay Bridge, Bath & NE Somerset ST728 596 (vice county 6) 22 July 2013 Chris Iles, 15 leaf mines on alder. River Avon, Bath, Bath & NE Somerset ST735 650 (vice county 6) 9 August 2013 Chris Iles, 2 mines on alder. Wellow, Bath & NE Somerset ST741 580 (vice county 6) 30 August 2013 Chris Iles, 4 mines on alder. (Also recorded by Chris Iles at other sites further into Somerset during 2013.) Very few previous records in the region.

Coleophora adpersella Benander Elm Farm, Burnet, Bath & NE Somerset ST66 65 (vice county 6) 9 July Richard Pooley *et al* (confirmed by dissection, Mike Bailey). Thought to be a first record for the whole of Somerset.

Phyllonorycter salicella (Zell.) ssp. *viminella* (Sircom) Combe Hay Bridge, Bath & NE Somerset ST728596 (vice county 6) 22 July 2013 Chris Iles, 1 leaf mine on willow.

Prays oleae (Bernard) Almondsbury Garden Centre, South Gloucestershire ST600 835 (vice county 34) 4 May 2013 (larval mines – emerged 23 May 2013) Martin Evans *et al*, larval mines & spinings on young olive saplings. A new arrival in the country on olive trees imported for the horticultural trade.

Bactra lacteana Caradja Compton Dando, Bath & NE Somerset ST6464 (vice county 6) 3 August 2013 Richard Pooley (confirmed by dissection, Mike Bailey). A first for the Bristol region.

The Moringa Budworm *Noorda moringae* (Tams) Fishponds, South Gloucestershire ST637 748 (vice county 34) 31 July 2013 Neale Jordan-Mellersh (det. Martin Honey, Natural History Museum). The first record in the British Isles for this species which is a pest of *Moringa oleifera*, a plant increasingly grown around the tropics as a foodstuff. The origin of this specimen is unknown.

Pediasia contaminella (Hb.) Weston-super-Mare, North Somerset ST33 65 (vice county 6) 20 July 2013 Paul Bowyer, at light. Confirmation that this species is present in the region.

Palpita vitrealis (Rossi) Clevedon, North Somerset ST398 708 (vice county 34) 28 August 2013 & 3 September 2013 Bob Fleetwood. Keynsham, Bath & NE Somerset ST653 678 (vice county 6) 1st week of August 2013 Alan Bone, one at light. Pilning, South Gloucestershire ST55 85 (vice county 34) 22 October 2013 John Martin. A rare migrant in most years.

Lepidoptera (macro-moths)

Small Eggar *Eriogastris lanestris* (L.) Uphill, North Somerset ST316 583 (vice county 6) 12 June 2013 Chris Iles, larval nest on hawthorn. A speciality of the coastal strip but the larval nests very vulnerable to hedge trimming.

Marsh Pug *Eupithecia pygmeata* (Hb.) Pilning, South Gloucestershire ST55 85 (vice county 34) 1 June 2013 John Martin & Andy Pym, one by day on flowery

waste ground. The first confirmed record from within the old 'Avon' county area, a species best looked for by day where mouse-ear grows.

Balsam Carpet *Xanthorhoe biriviata* (Borkh.) Toilet Block, Chew Valley Lake, Bath & NE Somerset ST5 5 (vice county 6) June 2013 Ian Stapp, one photographed. First record for the Bristol region of this species whose larvae are said to feed on Orange Balsam

Vestal *Rhodometra sacraria* (L.) Severn Beach, South Gloucestershire ST5 8 (vice county 34) 5 October 2013 Ray Cottrell, 3 at light. Pilning, South Gloucestershire ST55 85 (vice county 34) 7 October 2013 John Martin. Examples of the large-scale immigration to the UK of this species in 2013.

Convolvulus Hawk-moth *Agrius convolvuli* (L.) Keynsham, Bath & NE Somerset ST653 678 (vice county 6) 15 August 2013 Alan Bone, one at light. Never a common migrant to the region.

Bedstraw Hawk-moth *Hyles gallii* (Rott.) Bishopston Bristol ST58 75 (vice county 34) 27 August 2013 Jean Oliver. One example of this rare migrant in a garden moth trap.

The Brick *Agrochola circellaris* (Hufn.) Bishopston, Bristol ST58 75 (vice county 34) 29 October 2013 & 22 November 2013 Jean Oliver. An unusual species in the urban environment of Bristol.

Heath Rustic *Xestia agathina agathina* (Dup.) Elm Farm, Burnet, Bath & NE Somerset ST66 65 (vice county 6) 24 September 2013 Richard Pooley. Very few records of this species from the region.

Coleoptera (beetles)

Anaplytus mysticus (L.) Sand Point, North Somerset ST32 66 (vice county 6) June 2013 Margaret Webster. One photographed, not especially unusual but an attractive species to find.

Agapanthia villosoviridescens (DeG.) Pilning, South Gloucestershire ST55 85 (vice county 34) 06 July 2013 John Martin & Andy Pym. Longhorn beetle gradually becoming more established in the region.

Adonis Ladybird *Hippodamia variegata* (Goeze) Whitchurch, Bath & NE Somerset ST6 6 (vice county 6) 25 September 2013 Rich Andrews. Few records in the region of this species although probably overlooked.

Rugged Oil Beetle *Meloe rugosus* Marsh. Shirehampton, Bristol ST5 7 (vice county 34) 16 October 2013 Dave Gibbs. Confirmed at this site where previously recorded, very local and rare.

Meloe proscarabeus L. Frog Lane, Winscombe, North Somerset ST541 649 (vice county 6) 28 April 2013 Jim Webster. One photographed, all oil beetles are of local occurrence.

Silpha tristis Ill. Narrowways Local Nature Reserve, Bristol ST601 750 (vice county 34) 11 May 2013 Jon Mortin. Few records locally.

Silpha laevigata Fabr. Narrowways Local Nature Reserve, Bristol ST601 750 (vice county 34) 18 May 2013 Jon Mortin. Few records locally.

Black-headed Cardinal Beetle *Pyrochroa coccinea* (L.) Keynsham, Chocolate Factory site, Bath & NE Somerset ST658 693 (vice county 6) 5 June 2013 Jean Hathaway. One flew onto nettles by the River Avon, where photographed, a very local species.

Hymenoptera (bees, wasps and ants)

Nomada ferruginata (L.) Chew Valley School Wood, Bath & NE Somerset ST569 623 (vice county 6) 3 May 2014 Jon Mortin (det. Stuart Roberts). Thought to be the first record for the region, formerly a very rare species nationally but has been increasing.

Diptera (true flies)

Ctenophora pectinicornis (L.) Sommerville Road, Bristol ST594 751 (vice county 34) 7 July 2014 Jon Mortin (det. John Kramer). A scarce and nationally notable species, striking in appearance, thought to be the first record for the region.

Xanthogramma citrofasciatum (DeG.) Avon Gorge, North Somerset ST566 721 (vice county 6) 5 June 2013 Tony Cottrell. The first time seen in the Gorge by the recorder who has been monitoring species for some years at that site.

Rhingia rostrata (L.) Abbots Pool, North Somerset ST536 7732 (vice county 6) 8 September 2013 Tony Cottrell. This species continues to expand and increase in numbers.

Dexiosoma caninum (Fabr.) Shirehampton Road, Kingsweston, Bristol ST543 772 (vice county 34) 16 September 2014 Jon Mortin (det. Chris Raper). Very few records for this species locally.

Chilopoda (centipedes)

Scutigera coleoptrata (L.) Weston-super-Mare, North Somerset ST3 6 (vice county 6) 2013 Jackie Edwards, adult and juvenile in house. A European species accidentally introduced, the source in this instance is not known.

Annelida

Horse Leech *Haemopsis sanguisuga* (L.) Sommerville Road, Bristol ST 594 751 (vice county 34) 23 March 2014 Jon Mortin, one dead specimen. This subterranean predator of earthworms is rarely recorded.

Mammals of the Bristol District 2013

Roger Symes, BNS Mammal Recorder

Why record mammals? Don't the newspapers tell us that there are plenty of urban foxes; that hedgehogs are scarcer; badgers are everywhere; roe deer are plentiful; and otters have recovered – so why do we need to bother to write anything down? The recording of birds in U.K. has progressed significantly to the extent that the various schemes produce information which gives very interesting feedback to those who record, and provides meaningful data which influences scientific and political discussions at local and national, and indeed international, levels. Mammal recording has not reached that degree of sophistication in most places, much consists of arbitrary records of sightings rather than systematic studies. However even those casual records can provide valuable information – perhaps on distribution, breeding times and success, evidence of adverse effects on populations such as disease in rabbits and deer, hotspots of road accidents, dates of hibernation etc. Regular recording may then (hopefully) become a habit, as is clearly the case with some who have sent in observations. Those who are interested – and who let others know of that interest - are likely to be the ones who hear of, or see, things which may prove to be very important.

What is going to happen to our records? Unless an observer specifies otherwise all records received by the Mammal Recorder will be copied to Bristol Environmental Records Centre (BRERC) (www.brerc.org.uk), and to national recording schemes. Some of the information reported here (33 records) was supplied by BRERC, which is the repository for all records on information on all wildlife and geology in the area of the former county of Avon, and which provides information to the four unitary local authorities, and to consultants and others. Since the 1960's it has been a general practice to send information to record offices and to national schemes, but unfortunately the important records and maps of the early Mammal Section (1965 – 1980) have largely been lost following the death of the member who had stored many of them. This reinforces the importance of information being deposited in a central system. A significant number of records (212) for 2013 has been received from the BTO/JNCC/RSPB Breeding Birds Survey (BBS) (<http://www.bto.org/volunteer-surveys/bbs>), which is a systematic study carried out annually and sightings, or other evidence of mammals are recorded during walks. This survey is coordinated locally by the Avon Ornithological Group, an excellent example of collaboration for which grateful thanks are due to the organisers.

What is the purpose of the report? The decision to produce a report once again for the Bristol Naturalists' Society journal *Nature in Avon* was taken in February 2014 by the newly re-created Mammal Section of the Society, and reflected a resurgence of interest in mammals, not just in the Society but by other groups and individuals. A call in 2014 for information from 2013 resulted in 608 records from 2013 being made available from a variety of sources – a wonderful start! It is so important that there is feedback and updates to observers. This report on the mammals recorded in the Bristol district during 2013 aims to summarise, and build upon, reports of sightings, traces, road casualties, research projects and field meetings which have been received by the author, as BNS Mammal Recorder. The intention is that this and future reports on **Mammals of the Bristol District** will be one of the ways in which that is done, along with the Bristol Mammals Google Group (<http://groups.google.com/group/bristolmammalgroup>) and the Bristol Naturalists' Society website (<http://bns.myspecies.info/>). The report is not expected to be exclusive to, or reflecting only, B.N.S. information. Observations from other organisations who specialise in particular species or groups, are concerned with welfare of wildlife, or with conservation issues, will be sought, and will all be treated with equal weight in this report. It is really aimed to identify the pressures on mammals in the Bristol district, as well as gaining knowledge on their distribution and where possible abundance. It has not been possible with this report to make comparisons with existing databases, such as to identify new records. Much of this report has had to be processed and written overseas and time and availability of supporting data precluded that.

Handling Records:- Some names of mammals have changed in recent years, some in the name of the genus or species, and some in the common names. The names used in this paper are as listed in 2012 by the Mammal Society on their website www.mammal.org.uk. Where it has been spotted that another authoritative organisation uses a different version a note is added below. The unit of recording used by various organisations does vary. Some regard a one kilometre square too small a unit and use “tetrad”, which is a group of 4 x 1km. squares. Previous BNS Mammal Reports have listed the individual 1km squares in which mammals were reported and that will continue to be done for the immediate future. The Mammal Society has promoted the use of the word “hectad” to represent a 10 km. square, and that looks a useful initiative and the term is used in this report. In the species reports which follow the initial information shown is of the numbers of individual records for that species, and the number of observers who noted them. Then further information from the records may give details of some observations, followed by a note of the number of hectads from which records were received, together with the total number of 1 km squares in each hectad in which observations were recorded.

The numbers of 1km square records in each hectad might reflect population densities, but at this stage is more likely to reveal distribution of observers.

Names of Recorders: - The names of those who have contributed records for 2013 are listed at the end of the report. It is often the practice to link names with observations reported. This has not been possible here, mainly because of the late start and the shortage of time to complete the report by the Editor's deadline. The records received from BRERC did not identify the names of observers so those unknown contributors must be thanked also.

Species Reports

Insectivores (Insectivora)

Common Shrew (*Sorex araneus*):- 2 records by 2 observers. A BBS record was of an animal found dead and a BRERC record was of an adult animal heard. These were from 2 hectads, from 2 x 1km squares: ST76-1 and ST75-1.

Pygmy Shrew (*Sorex minutus*):- 1 record by one observer from 1 hectad – ST67. This was a BRERC record of an adult Pygmy Shrew found dead.

Water Shrew (*Neomys fodiens*):- No records received for 2013.

European Mole (*Talpa europaea*):- 49 records by 22 observers, 39 of which by were BBS observers. One mole was found dead, the rest were mole hill records. Records from 16 hectads, from 40 x 1km squares: ST36-2, ST45-3, ST46-1, ST47-3, ST55-5, ST56-1, ST57-7, ST58-2, ST66-1, ST67-2, ST68-4, ST69-1, ST75-1, ST76-3, ST77-3, ST78-1.

Eurasian Hedgehog (*Erinaceus europaeus*):- J.N.C.C. lists this as **West European Hedgehog**. 21 records by 4 observers, and 2 records from BRERC. Seven sightings included one hedgehog in hibernation. The most animals seen at once was 3 in an urban garden when mating was observed on 15th August. Two records were by camera traps. 12 reports were of road casualties. There were no records of young hedgehogs. Records from 9 hectads, from 13 x 1km squares: ST47-3, ST56-1, ST57-3 (9 records), ST58-2, ST65-1, ST67-1, ST68-1, ST75-1. National status is "common" (R.D.B.), BRERC Area status is "common – declining?" Included in Avon BAP, BNES BAP, S GLOS BAP and BCC BAP.

Rodents (Rodentia)

Harvest Mouse (*Micromys minutus*):- No records for 2013.

House Mouse (*Mus musculus*):- No records for 2013.

Wood Mouse (*Apodemus sylvaticus*):- 8 records by 6 observers. 7 records were of sightings, one BBS record was from “local knowledge”. 2 families were found in separate nest boxes. Records from 5 hectads, from 8 x 1 km squares: ST47-1, ST55-3, ST56-2, ST57-1, ST67-1.

Yellow-necked Mouse (*Apodemus flavicollis*):- No records for 2013.

Bank Vole (*Myodes glareolus*):- 2 records by 2 observers, one of these from BBS “local knowledge”. The sighting was of an adult found dead – a victim of cat predation. Records from 2 hectads, from 2 x 1km squares: ST58-1, ST67-1.

Field Vole (*Microtus agrestis*):- 7 records by 4 observers. Three records were of sightings, one of which was of a Field Vole seen regularly in a rural garden under a bird feeder. 2 records were of adult animals found dead and obviously killed by cats. 2 BBS records were attributed to “local knowledge”. Records from 4 hectads, from 5 x 1km squares: ST56-1, ST58-1, ST65-1, ST67-2.

Water Vole (*Arvicola terrestris*):- 2 records by 2 observers (1 from BRERC, 1 from BBS “local knowledge”) from single 1 km squares in 2 hectads: ST47 and ST76.

Hazel Dormouse (*Muscardinus avellanarius*):- 18 records by 1 observer from one hectad ST57. A project by Hannah Broughton, in which approximately monthly visits to 60 nest boxes in Leigh Woods during dates between May and November 2013 resulted in finding Dormice on 18 occasions. The earliest that animals were found was 23rd June, and the latest November. Those found on 23rd June, and some on 21st July were torpid. Others were active on 21st July and subsequently. Litters were found on 25th August, 15th September and 20th October. On 25th August young had eyes open, suggesting they were about 2 weeks old. Active juveniles were found in November.

Brown/ Common Rat (*Rattus norvegicus*):- 14 records by 10 observers. 6 live sightings, 3 road casualties, one killed by a cat were animals actually seen, with 1 field sign record and 3 BBS “local knowledge” records. Records from 8 hectads, from 13 x 1km squares: ST35-1, ST45-1, ST47-1, ST57-2, ST58-3, ST67-3, ST77-1, ST78-1

Grey Squirrel (*Sciurus carolinensis*):- 100 records by 48 observers. 88 of these records came via BBS recorders. 4 animals were road casualties, another was found dead. One record was of field evidence, all the rest were sightings. There were no records of young squirrels. Records from 17 hectads, from 80 x 1km squares: ST36-

3, ST45-4, ST46-2, ST47-9, ST55-3, ST56-3, ST57-20, ST58-2, ST65-3, ST66-3, ST67-9, ST68-6, ST69-1, ST75-1, ST76-6, ST77-3, ST78-2.

Rabbits and Hares (Lagomorpha)

Rabbit (*Oryctolagus cuniculus*):- 94 records by 41 observers. All records were live sightings except for 5 road casualties, 3 of field signs, and one BBS "local knowledge" record. 75 records came from BBS. Juvenile rabbits were first recorded on 4th March with 4 more records up to 8th May. One half grown young was spotted on 29th December. There was one record of an adult at North Weston, Somerset with myxomatosis, showing classic swelling around the face and hunched posture. Records from 18 hectads, from 68 x 1km squares: ST35-3, ST36-2, ST45-4, ST46-4, ST47-8, ST 55-3, ST56-5, ST57-5, ST58-6, ST66-3, ST65-1, ST67-5, ST68-4, ST69-1, ST75-2, ST76-3, ST77-6, ST78-3.

Brown Hare (*Lepus europaeus*):- 33 records (31 from BBS) by 11 observers. Seven Hares were seen in a 1km. square on 13th May. Records in 12 hectads, from 27 x 1km squares: ST35-1, ST36-2, ST45-3, ST55-3, ST56-1, ST57-1, ST65-4, ST66-3, ST67-1, ST75-4, ST77-3, ST78-1.

Carnivores (Carnivora)

Fox (*Vulpes vulpes*):- 66 records by 33 observers. 35 of the records were from BBS observers. 7 animals were road casualties, but most records were of sightings of live animals, with two camera trap images being obtained. Whilst there was a good spread of records across the area there was a strong focus on multiple observations from two observers, in ST57 and ST58. There were 4 records of young animals, cubs being identified specifically on 11th May, 2nd and 22nd of June, and "during 2013". A lactating vixen was recorded on 25th May. There were no records of fox earths or other den locations. Records from 17 hectads, from 48 x 1km squares: ST35-5, ST36-2, ST45-1, ST46-2, ST47-4, ST55-3, ST56-2, ST57-6, ST58-3, ST66-3, ST67-5, ST68-4, ST69-1, ST75-2, ST76-1, ST77-2, ST78-2.

Badger (*Meles meles*):- 57 records, with 46 records by 17 observers (including 17 records from BBS) and 11 records from BRERC. Sightings of live animals were reported in 21 records, badgers found dead or road casualties on 23 occasions. One road casualty involved a juvenile, and another report was of two animals close together, freshly killed near a junction. The rest were reports of field evidence – tracks and latrines. No sett locations were reported. Highest number of badgers reported together was 6 in a Pilning garden, along with a fox. There were no records of cubs other than the road casualty. Records from 14 hectads, from 50 individual 1 km squares: ST36-2, ST46-4, ST47-8, ST55-3, ST56-2, ST57-7, ST58-5, ST65-2, ST66-2, ST67-3, ST75-3, ST76-4, ST77-3, ST78-2. Highest number of actual

records were from ST58–11 records in 5 x 1km squares, ST57-8 records in 7 x 1km squares, and ST47-8 records in 8 x 1km squares.

Otter (*Lutra lutra*):- 15 records, by 5 observers (1 was BBS) and 10 records from BRERC. 6 records were of sightings of live otters, specifically identifying 2 females and a male. One of these females was seen swimming with 3 cubs, and at another site 2 juveniles were noted. 7 records were based on spraints, and one on tracks. One unfortunate animal was found dead at the roadside. Records from 7 hectads from 11 x 1km. squares: ST55-1, ST56-1, ST57-1, ST65-2, ST67-2, ST68-3, ST75-1.

American Mink (*Neovison vison*):- 1 record by 1 observer from hectad ST66. This was a black adult animal, dead on the road.

Stoat (*Mustela erminea*):- 4 records by 4 observers. 3 records were actual sightings, including in one case of 2 stoats, and the 4th was a BBS record based on “local knowledge”. Records from 3 hectads, from 4x1km squares: ST56-1, ST57-2, ST67-1.

Weasel (*Mustela nivalis*):- 3 records from 2 hectads. 2 were actual sightings of single live animals, the other was a BBS “local knowledge” record. Records from 2 x 1km. squares: ST58-1, ST67-2.

Bats (Chiroptera)

Unidentified Bats:- 2 BRERC records of animals seen in summer in single 1km squares in ST57 and ST68. It is helpful to receive sightings of bats which cannot be identified specifically by the observer, especially if there are regular occurrences. It may be possible to follow up some of these.

Daubenton’s Bat (*Myotis daubentoni*):- 1 BBS local knowledge record in May from ST55.

Lesser Horseshoe Bat (*Rhinolophus hipposideros*):- 13 records, by 2 observers (1 BBS) and 2 BRERC records. 10 records were from Chew Valley Lake of bats in hides. 9 records from April, with single records from each of February, May, June and October. Records from 3 hectads, from 4x 1km squares:- ST55 – 1 (BBS local knowledge), ST56 –2, ST77 – 1.

Brown Long-eared Bat (*Plecotus auritus*):- 1 record dated April from BRERC. involving ST55.

Noctule Bat (*Nyctalus noctula*):- 1 BBS local knowledge record in May from ST55.

Pipistrelle Species:- 11 records of sightings, in all but one case identification was not specific enough to be recorded as other than Pipistrelle species. The exception was a BRERC record of a single 45 or 55 kHz Pipistrelle recorded in April. Records (including one BRERC and one BBS local knowledge) were from May through to September. They were from 4 hectads from 5 x 1 km squares in ST46-1, ST55-1, ST57-2, and ST 58-1.

Even-toed Ungulates (Artiodactyla)

Reeves' Muntjac (*Muntiacus reevesi*):- 1 sighting (BBS record) from 1 x 1km. square in one hectad: ST78.

Roe Deer (*Capreolus capreolus*):- 79 records by 39 observers. 58 records came from BBS recorders. Fawns, one pair of twins and one single, were recorded on 2nd and 17th of June. The single was found dead, killed by silage making. The largest number seen together was one buck and 5 does at Chew Stoke, one adult was seen regularly, feeding in an urban garden in Clevedon. Records from 65 x 1 km squares in 17 hectads: ST35-2, ST45-6, ST46-3, ST47-4, ST55-6, ST56-4, ST57-5, ST65-3, ST66-4, ST67-7, ST68-3, ST69-1, ST75-3, ST76-4, ST77-6, ST78-3, ST79-1.

Fallow Deer (*Dama dama*):- 2 records from 1 hectad, both from 1 Km square ST66 (BBS records).

Seals (Pinnepedia)

No records received for 2013.

Whales, Dolphins and Porpoises (Cetacea)

No records were received for 2013.

Recorders

Grateful thanks go to the 89 known observers (including BBS) who contributed records for 2013. If your name is not on the list below then my apologies if you sent in records, it should hopefully be only the name which has been missed from this list, the information should have been included. Thanks also to BRERC for records from un-named recorders.

Sheila Ablitt, John Aldridge, Brian Anderson, Marc Anderton, Rodney Artingsall, Rosemary Atkins, Steven Ayers,

Michael Baker, John Barnett, Sue Black, Susan Blackmore, Richard Bland, Des Bowring, BRERC, Gill Brown, Richard and Rosemary Brown, Hannah Broughton, David Bull, Margaret Bulmer, David Chalk, Sue Chapman, Becky Coffin, Judy Copeland, Nigel Crocker, Alex Crossman, Megan Dickens, Clare Diprose, Tony Dudman, Phyl Dykes, Dave French, Julian Garrigan, Ken Hall, Jeff and Celia Holmes, Geoff Harris, Nick Hawkridge, Martin Hunt, Anne and David Jewell, Harold Johnstone, Penny Ladd, Mandy Leivers, Alison Levinson, Stephanie Lockhart, Harriet Lupton, John Martin, Duncan McLaughlin, Tom McLellan, Richard Mielcarek, Nigel Milbourne, David Moore, Giles Morris, Colin Morris, Jon Mortin, David Nevitt, Julian and Peter Ottley, Sian Parry, John Percival, Chris Perry, John and Sue Prince, Robin Prytherch, Jeff Rawlinson, Trevor Riddle, Chris Cross, Sue Sayers, Richard Scantlebury, Oliver Smart, Vince Smith, Charles Stapleton, Brian Steadman, Mary Jane Steer, Roger Steer, Dave Stoddard, Gavin Stoddard, Geoff Suter, Kerry Sutton-Spence, Roger Symes, Mark Taylor, David Teague, Graham Turner, David Warden, Keith Williams, Robert Williams, Hazel Willmot, Paul Vokes, Gordon Youdale, Stuart Young.

Was it all worth it?

The highest number of records was 94 for Rabbits. The most observers (48) reported Grey Squirrels. The most hectads in which a species was recorded was 18 for Rabbits, and the highest number of 1km squares in which a species was recorded was 80 for Grey Squirrels. Other species did push close to these figures, some almost remarkably so compared with previous years. For example Roe Deer were noted in 17 hectads and 65 x 1km squares, some of these urban. What is happening which is driving this change? It is not possible at present to indicate if any of these were new records for hectads, that sort of refinement can be built upon in future reports. Some useful information is starting to be collated on aspects such as breeding dates but there is plenty more which can be added to our recording effort. This is not just about distribution but trying to document the pressures on our local wild mammals, and the successes achieved by some species.

Please keep recording distribution and other information. Do make contact with other groups and individuals who you know are interested in wild mammals and encourage them to contribute information for 2014. This report will not disclose any information considered sensitive but it would be helpful to know what mammal enthusiasts are doing in the Bristol District. That information is probably not drawn together anywhere else.

Invertebrate Records from Steep Holm

By Jonathan Mortin (Bristol Regional Environmental Records Centre)

This article was supported by a grant from the Bristol Naturalists' Society to analyse and process a database of invertebrate records from Steep Holm.

Introduction

Steep Holm is a small island in the Bristol Channel around 8 km from Weston-super-Mare and five km from Brean Down. It is owned by the Kenneth Allsop Memorial Trust. It was originally designated as a Site of Special Scientific Interest mainly for its botanical and ornithological interest but it has also been found to support genetically distinct populations of snails and slow-worm. The island is administered as part of North Somerset Council and is the largest island (25ha) within the recording area of Bristol Regional Environmental Records Centre (BRERC).

In September 2013 BRERC were sent a database of invertebrate species recorded on Steep Holm up until 2009. The database includes around 6,000 records of 1,948 different species. These records include many rare or under-recorded taxa both locally (within the BRERC region) and nationally. Work has commenced to incorporate these records into the main BRERC species database (from where they will be accessible to the rest of the world). This article summarises some of the more interesting invertebrate records contained in the database and in other relevant publications. It is significant in its timing as 2014 is the centenary of the first ever visit to Steep Holm by members of the Bristol Naturalists' Society. Species given in **bold type** are notable within the BRERC region.

The History of Invertebrate Recording on Steep Holm

Steep Holm has long attracted the interest of naturalists with the first botanical records dating back to 1562 (Bridgewater 1971). Indeed the fact that there is such a long history of biological recording on Steep Holm is another reason for the island's designation as an SSSI. Thomas Clark, a botanist from Bridgewater, visited Steep Holm in 1831 and recorded four species of terrestrial snail which represent the first invertebrate records (Dilks 1939). Cardiff Naturalists' Society then visited the island in 1877 and 1883 also recording four species of terrestrial snail (including **Heath Snail** *Helicella itala* and **Large Chrysalis Snail** *Abida secale*) on their second visit (Thomas 1884). More recording took place in 1902 including records of **Silver-washed Fritillary** *Argynnis paphia* and **Small Heath** *Coenonympha pamphilus* (Knight 1902).

Bristol Naturalists' Society first visited the island in 1914 to record plants and terrestrial invertebrates. That visit produced a list of 92 species of flowering plants, 40 species of insect and 29 other invertebrate species (Roper *et al* 1915). None of the insect species were regarded as rarities at the time although the list includes 4 species which are now nationally notable (including **Bombardier Beetle** *Brachinus crepitans*) and three species which are now **UK BAP** species (**Small Heath**, *Galium Carpet* *Epirrhoe galiata* and **Cinnabar** *Tyria jacobaeae*).

Bristol Naturalists' Society visited Steep Holm again in 1938 this time noting 53 species of insect (Parnell 1939) and 34 other species of terrestrial invertebrate (Hamilton 1939). The list included 7 nationally notable species such as **Slave-making Ant** *Formica sanguinea*, **Brown Ant** *Lasius brunneus*, **Lesser Cockroach** *Ectobius panzeri*, **Great Brocade** *Eurois occulta* and **Crescent Striped** *Apamea oblonga*. This visit also included the first systematic recording of marine and intertidal invertebrates on Steep Holm (Yonge & Lloyd 1939). Only 16 species were recorded although the list includes the nationally notable **Sea Slater** *Ligia oceanica* (also recorded in 1914). Eight of the marine species recorded also represent the first (and so far only) records from the BRERC region including Black Squat Lobster *Galathea squamifera*, Cave-dwelling Anemone *Sagartia troglodytes* and China Limpet *Patella ulysiponensis*. Marine records from Steep Holm are also included in an article by Bassindale (1941). Marine taxa are relatively under-recorded compared to other invertebrate groups but the shore fauna of Steep Holm has generally been regarded as lacking in diversity due to factors such as low salinity and high turbidity (Yonge & Lloyd 1939, Crothers 1981).

Bristol Naturalists' Society visited Steep Holm in 1948 with an article published by Boyd (1949) on the terrestrial Isopoda (woodlice). Nine species were recorded including the nationally notable *Armadillidium pulchellum*. Boyd also recorded *Armadillidium pictum* although this is a very rare species and the record has not been confirmed.

The Mid Somerset Naturalists' Society made a number of visits to Steep Holm between 1953 and 1956 contributing a number of invertebrate records (Smith 1972, Parsons 1996). These included the nationally notable *Chyliza extenuata* (a psilid fly). **Northern Rustic** *Standfussiana lucerneae* was also recorded which is now believed to be extinct in the BRERC region. The spider fauna of Steep Holm was investigated in 1968 and 1969 with 39 different species recorded including the notable *Ozyptila blackwalli* and *Segestria bavarica* (Chase 1971, Chase 1972).

More systematic and thorough recording of invertebrates began soon after the island was purchased by the Kenneth Allsop Memorial Trust in 1976. Regular reports were published by the Trust (edited by Tony Parsons) including invertebrate records recorded and identified by him and other specialists. A total of 25 reports were published from 1978 to 2009. They contain around 7,000 records of which about half (52%) have so far been entered onto the BRERC database. Notable records include the nationally notable **Ruddy Streak** *Tachystola acroxantha* (2008) and the beetle *Melanophthalma distinguenda* which was recorded in 1995 having only previously been recorded on Lundy Island within the UK.

Sabellaria reefs constructed by the honeycomb worm *Sabellaria alveolata* were first noted on Steep Holm in 1986 (Parsons 1996). They are only found on shores with strong to moderate wave action and now constitute a **UK Biodiversity Action Plan Priority Habitat**. The reef declined drastically after 2003 apparently due to storm damage (Parsons 2009). The reef now seems to be regenerating, see photograph below.



Database update

Before the current project began, the BRERC database held 6,279 records of 1,515 different species (across all taxonomic groups) from Steep Holm. This included 1,108 species of invertebrate. The current project has contributed an additional 285 invertebrate species (and 5 plant species) so that the total count (on the BRERC database) for Steep Holm now stands at 1,805 species (with 1,393 species of invertebrate). Of the invertebrates, 16 are nationally notable, 16 are UK BAP-listed and an additional 45 species are notable within the BRERC region. 183 of the invertebrate records represent the first (and so far only) record for that species in the BRERC region.

Conclusion

The detailed recording of invertebrates on Steep Holm across a wide range of taxonomic groups and over a long period of time has provided an extremely valuable data set. This will allow a better understanding of both Steep Holm itself but is also invaluable in a broader context. The records reveal the changing distribution over time of these taxa both regionally and nationally. Eleven species recorded from Steep Holm represent the first UK records for those species reported to the National Biodiversity Network (NBN). The recording of so many rare taxa on Steep Holm over the years is a testimony to the diligence of the individual recorders. Many of these species may turn out to have much wider distributions, but to establish that will require similarly thorough and enthusiastic recording elsewhere. Meanwhile, it is hoped that biological recording across a wide range of taxonomic groups will continue on Steep Holm itself.

References

- Bassindale R. (1941) Studies on the Biology of the Bristol Channel IV : The Invertebrate fauna of the southern shores of the Bristol Channel and Severn Estuary. *Proc.Bristol Nat.Soc ser.4,9: pp143-201.*
- Boyd H. (1949) The terrestrial Isopoda of Steep Holm. *Proc.Bristol Nat.Soc 27 (5) pp483-485.*
- Bridgewater P. (1971) The Vegetation of Steep Holm, Bristol Channel. *Proc.Bristol Nat.Soc 32 (1)pp73-79.*
- Chase B.J. (1971) The Spider Fauna of Steep Holm. *Proc.Bristol Nat.Soc 32 (1)pp70-72.*
- Chase B.J. (1972) The Spider Fauna of Steep Holm; addendum. *Proc.Bristol Nat.Soc 32 (2)pp161-162.*
- Crothers J.H. (1981) Marine Fauna in *Steep Holm: a survey*. Somerset Archaeological and Natural History Society.
- Dilks T.B. (1939) Thomas Clark's Account of a visit to Steep Holm in 1831 *Proc.Bristol Nat.Soc.*

- Frewin G.L. (1981) Coleoptera in *Steep Holm: a survey*. Somerset Archaeological and Natural History Society.
- Gillard C. (1969) A report on Steep Holm slugs and snails *Rep. Steep Holm Gull Res. Stn. 3* pp24-7.
- Hamilton J.E. (1939). A survey of Steep Holm VI: Land Invertebrates excluding insects. *Proc.Bristol Nat.Soc ser 4, 8: pp468-470*
- Knight F.A. (1902) Seaboard of Mendip. London.
- Parnell G.W. (1939). A survey of Steep Holm VII: Entomology. *Proc.Bristol Nat.Soc ser 4, 8: pp471-473*.
- Parsons A.J. (1978) Notes on some Invertebrates of Steep Holm. *Proc.Bristol Nat.Soc. 36: 93-111*.
- Parsons A.J. (1981) Non-marine Invertebrates in *Steep Holm: a survey*. Somerset Archaeological and Natural History Society.
- Parsons A.J. (1996). The Invertebrates of the Island of Steep Holm in the Bristol Channel. Somerset Fauna & Flora: 2. Kenneth Allsop Memorial Trust.
- Parsons A.J. (2009) Steep Holm Natural History Report 2008/2009 Kenneth Allsop Memorial Trust.
- Roper, I.M., Pearcey F.G., Griffiths G.C. & Bartlett C. (1915). The Natural History of Steephholm *Proc.Bristol Nat.Soc. 4* pp143-149.
- Smith K.G.V. (1972) The Diptera (Insecta) of Steep Holm. *Proc.Bristol Nat.Soc 32 (2)* pp157-160.
- Thomas T.H. (1884). Excursion to the Steep Holm. *Trans.Cardiff Nat.Soc. 15* pp.88-93.
- Yonge C.M. & Lloyd A.J. (1939). A survey of Steep Holm, VIII: The Shore Fauna. *Proc.Bristol Nat.Soc ser 4, 8: pp474-478*.

A report of the June 16th 2014 Centenary trip to Steep Holm.

Richard Bland

Re-greening is all the fashion these days, and it was fascinating and rather weird to visit a site that has essentially been abandoned to the wild. Ten members visited the island on a very hot June day. It is an extraordinary place, in which species common on the mainland were rare and some unusual species were common. The island is now dominated by a dense cover of Alexanders with Nettles, Brambles, Privet and on the cliff faces young Tree Mallow in full bloom. Inside this cover were hundreds of newly hatched gull chicks, and the adults constantly attacked all members of the party. The gull cries were incessant, and recording was difficult. Paths had been strimmed to give access to the various military monuments, and many of the plant species occurred along these paths. Ray Barnett noted the absence of predators which enables some invertebrate species to be present in huge numbers. Just 12 bird species were seen, in very low numbers apart from the Gulls. There were no insectivores. The only grazing animal is a Muntjac deer whose droppings were found. There are apparently up to 40 of them, but little sign of their activity. As a result the only grass is that maintained by human activity. And the absence of cats and rats gives the gulls immunity.

The total of 250 individual species were identified. There were 118, of which a surprising 21 were trees, and seven were new to the island. A century ago there were just three Sycamores, and they have become a Sycamore wood dominating the eastern cliff, but showing no sign of spreading further. They include two Fig trees, a Strawberry tree, and a row of young Ashes which may come to dominate the island in time. Of the plants species 31 were only found in a single location, though this maybe a function of the date of the visit. Red Dead Nettle, Nipplewort, Knotgrass, Meadow Buttercup, White Clover and Common Speedwell were rare, and Ribwort Plantain was represented by a single plant. In contrast Henbane and Hounds Tongue were frequent and Stinking Iris common.

102 lichens were identified, 59 of which were new, and six were rare or endangered. Some 97 invertebrate species were identified including 20 spiders, five of which were new to the island, 15 molluscs and six butterflies. The Sabellaria reef covering the rocks at the end of the spit was recorded and a Seal was seen.



A note on the rate of change in plant species.

In 1914 Steep Holm was inhabited and farmed, and there were goats, a donkey, and rabbits in abundance. In the Second World War it was taken over by the military, and subsequently became a nature reserve, with no permanent human occupation. From details recorded by the Somerset Naturalists Society in 1881 there were, in 1914, 139 species that had been recorded on the island since the very first, Alexanders, described in 1562 by William Turner. By 2000 52 of these had vanished, and 87 remained, though we did not find all of them. This gives an extinction rate of 0.5 species a year.

In the course of the twentieth century 97 new species were recorded, most of them after 1960. Of these 33 were only recorded once, and 25 had disappeared by 2000, leaving 39 still in existence. That gives an immigration rate of 0.6 species a year throughout the century.

In the present century a serious recording effort by BRERC has led to the identification of 81 new species, though 46 of them have only been recorded once. We recorded 33 of them, and added seven new species. They were Holly, Hazel, Tansy, Soapwort, Rosemary, Corn Salad and Marsh Thistle. Obviously this is an exceptional rate of change, caused in part by deliberate planting, especially of tree species, in part by a greater recording effort associated with the effort to produce the plant atlas in 2000. Other factors at work are the extinction of the rabbit population in 1997, and the appearance of some 40 Muntjac deer, though as yet they are making little impact on the vegetation.

The average duration of a species on the island since 1881 has been just over 90 years, and at any one time there are about 120 species present.



Landing, J Mortin

Weather report for 2013

R.L.Bland

Data sources

The BNS began publishing weather data in 1872 with GF Burder's paper on rainfall in Clifton since 1853, and that led me to search for temperature data back to that date. From 1920 until its closure in 2002 the Long Ashton research station provided that data that was published, and since then I have used the Times daily report for Bristol, though since 2000 I have used my own rain gauge. There is an excellent website at www.afour.demon.co.uk which has also traced records from some other sources back to 1853, and I have used these to fill in gaps. A long series is crucial to any understanding of the continuous process of climate change, which is normally defined as the average of the previous thirty years. I use the term "long-term average" to mean the average back to 1853. Most meteorologists use the mean daily temperature as the basis, but many sources only quote the daily maximum and so I have used that figure throughout.

2013 had the lowest March temperature since 1962, the hottest July and summer since 1983, and half the rainfall of 2012.

Year	04	05	06	07	08	09	10	11	12	2013
Av. Max °C	14.3	14.4	14.7	14.5	13.7	14.6	14.2	15.5	14.7	14.8
Ten year av. °C	14.2	14.2	14.4	14.4	14.3	14.3	14.3	14.4	14.5	14.5
Rainfall mm	945	896	952	1107	1150	986	747	847	1420	799
Ten year av. mm	954	956	974	997	1005	993	943	945	981	983

Table 1 Average mean maximum temperature and rainfall. The second row is the average for the ten years up to and including the year referred to.

Seasons.

The average for the **winter** (Dec. 2012 to Feb. 2013.) was 7.7°C, close to the long term and the ten year averages. Rainfall average 101mm a month, December being very wet and February very dry. There were 40 frost nights (October to April), the last on April 7th, 22 of them in March and April, ensuring a very cold late spring. There were scold snaps between Jan. 12th and 25th, and Feb. 21st to March 3rd and then March 21st to April 7th. There were 8 days of lying snow in January, and ponds were frozen for a total of 13 days up to the end of February.

Spring (March to May) Average temperature was 12.3°C, the coldest since 1996 caused by the coldest March since 1962. Rainfall at 52mm a month was below the long term average.

Summer (June to Aug.) Average temperature at 22.9°C was the warmest since 1983, caused by a three week spell of hot dry weather in July. Rainfall at 37mm a month was the driest since 1995.

Autumn (Sept.-Nov.) Average temperature at 15.7°C was normal, Rainfall at 91mm a month was also average.

Seasonal Comparisons To put the 2013 seasonal average temperatures into perspective, Table 2 shows the seasonal temperature extremes, with their year, the average since 1853, and the difference between 2012 and the long term average. The most obvious feature is the fact that the second half of 2013 was much warmer than average.

	2013	Min	Max	Av, since 1853	Diff.
Winter	7.7°	1917-2.5	1920-10.6	7.5°	0.2°
Spring	12.3°	1887-10.4	1893-16.6	13.0°	-0.7°
Summer	22.9°	1883-18.0	1976-23.9	20.2°	2.7°
Autumn	15.7°	1915-10.6	1959-16.8	14.0°	1.7°
Annual	14.8°	1892-12.1	1921-15.6	13.7°	1.1°

Table 2 2013 seasonal average temperature compared with minimum, maximum and average since 1853.

Table 3 gives the same detail for rainfall. Winter rainfall was heavily influenced by December, as both January and February were dry months, as was the summer

	2013	Min	Max	Av. since 1853	Diff
Winter	101	1964-21	1995-154	79	22
Spring	52	1893-17	1981-107	60	-8
Summer	37	1995-11	2012-149	74	-37
Autumn	91	1978-26	1935-173	87	4
Annual	67	1864-49	2012-118	75	-11

Table 3 Average monthly rainfall in mm for each season in 2013 showing the maximum, minimum and average since 1853, and the difference between 2013 and the average since 1853.

Monthly percentage deviation in 2013 from the average since 1853.

Temperature July and December were well above average, March well below.

Rainfall. February, April, June and August were very dry and October wetter than average.

	Temp	Rain			Temp	Rain
Jan	2	15		Jul	26	-18
Feb	-6	-65		Aug	11	-71
Mar	-24	-7		Sep	9	-39
Apr	1	-42		Oct	19	67
May	1	8		Nov	2	-10
Jun	4	-56		Dec	30	45

Table 4 Monthly percentage deviations in 2013 from the norm

Monthly Summary 2013

	Ja	Fe	Ma	Ap	Ma	Ju	Jy	Au	Se	Oc	No	De	Av.
Temp °C	7.3	7.1	17.6	12.8	16.5	20.1	26.2	22.5	19.7	16.7	10.4	10.2	14.8
Rain mm	97	22	56	33	67	27	59	25	48	159	78	128	66

Table 4 2013 Monthly average temperatures and total rainfall

January The first week was warm with SW winds and overcast skies, but on 10th the wind turned east and then north and temperatures fell and frost brought ice on 16th and 4 ins of snow on 18th, which remained to 25th, and a maximum of 0°C on 20th. Winds turned southerly on 16th and 14°C was reached on 29th, bringing the first significant rain in a dry month.

February Began with NW winds sunny days and cool temperatures. A warm spell from 14th to 19th, with bright sunshine, under S winds, gave way to cold SE and then NE winds round a Baltic high, and a return to frosty nights and cold days, max 3°C, for the rest of the month, which was very dry.

March A warm start, with 17°C recorded on 5th was rapidly followed by cold easterly winds round a Greenland high, and frosts from 10th-14th, bring both some bright sunshine and ice to ponds. There was a brief respite on 15th, with the only decent rainfall of the month, and then a return to cold days, with a maximum of 1°C on 24th, and ice on ponds for the rest of the month. It was the coldest March since 1962, and only just warmer than 1916, the coldest on record since 1853.

April For the first week easterly winds persisted with night-time frosts, but brilliant sunshine raised day maxima reached 12°C on 6th. At last on 11th the wind shifted south, and a proper depression, effectively the first of the year, swept through. Temperatures reached 16°C on 16th, but it remained very dry and sunny with southerly winds dominating from 14th to 24th to give an opportunity for migrants to come through.

May. The first week was dominated by SW winds, clear skies, (13.6 hours of sunshine on 1st) and high temperatures (reaching 25°C on 7th). There was a cooler spell from 9th to 16th, the temperature only reaching 10°C on 14th, but it remained warm and dry for the rest of the month, with more northerly winds round an Atlantic high, though there were very cool days on 23rd, 24th and 28th

June The first nine days were dominated by high pressure, NE winds, up to 15 hours of sunshine, and temperatures up to 23°C, and they were completely dry. From 10th to 16th SW winds brought a little rain, and a slightly lower temperature down to 16°C maximum. On 19th temperatures peaked for the month at 27°C and then high pressure took over from 25th that was to dominate the next four weeks. Only an inch of rain fell in the entire month.

July The first three weeks were dominated by high pressure, clear skies, and temperatures that reached 32°C on 22nd. Winds were light, there was no rain, grass turned pale, and half the plants on the Downs ceased flowering. It was the hottest July since 1983. On 23rd low pressure took over, rain fell, and temperatures dipped a little under the influence of SW winds.

August The highest temperature of the month was 31°C on 1st, but it only twice fell below 20°C. There was very little rain, normal sunshine, and from 11th a high pressure system to the east kept winds light.

September The first 12 days were hot and sunny but temperatures fell below 20°C on 13th, and a decent 17mm of rain fell. It was warmer again from 19th-25th, but overcast. And the last few days were dominated by easterly winds. By this point in the year total rainfall was 140mm, or two month's worth, below normal.

October For the first week the temperature remained around 20°C, but then fell to around 17°C for the rest of the month. The long sequence of dry days that had set in since January creating the situation where only one day in four saw any rain, ended on 12th, and westerly winds became dominant around a series of Atlantic lows.

November The first week was warm (up to 15°C) and wet but temperatures fell to 8°C, the coldest since April 4th, on 8th, and the first frost came on 19th, with a daily maximum of 7°C. High pressure bringing N winds dominated for the last two weeks, and the month was effectively dry from 11th. Autumn was almost 2°C warmer than average.

December The first ten days were dry, dull and warm but the first rain came on 15th and 16th and temperatures reached 14°C for the last time. The next two weeks saw a series of intense depressions sweep across, bringing strong SW winds, heavy rain and flooding to some areas over the Christmas week, though Bristol missed the worst of both the wind and rain. By the end of the year, despite the cold spring, the annual average temperature was the same as 2012.

Weather Extremes.

The table below gives figures for extreme annual events over the past decade, enabling the extreme events of 2013 to be put in perspective. There seems to be no pattern in these figures. It is also interesting that, contrary to common perception, two days in every three have no rain at all.

		4	5	6	7	8	9	10	11	12	2013
Hottest day	C°	28	30	35	27	28	28	26	29	30	32
Coldest day	C°	3	0	0	2	2	-1	-5	1	1	0
Wettest day	mm	45	47	39	40	35	36	36	40	72	33
Sunniest day	Hr	13.9	14.8	14.7	14.1	14.9	14.7	15.6	14.7	15	15
Longest dry	days	19	14	22	24	16	20	24	23	17	20
Longest wet	days	14	7	11	8	8	8	7	5	15	9
Frost, nights	days	30	32	33	25	44	42	76	22	41	67
Snow	days	6	2	2	2	1	19	33	0	1	8
Storms	days		1	3	6	4	1	1	1	1	1
Hotter than 25°C	days	13	14	27	1	7	5	3	14	19	32
Colder than 5°C	days	15	26	39	18	14	37	60	13	16	29
More than 10hr sun	days	19	38	36	45	29	49	46	44	38	44
No sun	days	90	89	107	99	95	95	106	104	93	95
No Rain	days	231	248	234	238	228	265	269	253	205	238

A note on climate

Climate is defined as the normal weather measurements over a period of time, usually thirty years. Because it is an average it changes slightly every year. Weather varies much more from year to year than climate does in centuries, and birds like all other wildlife respond to the changing conditions they experience. Data gathered over the last decade on the Downs suggests that as a general rule a one degree change in average temperature will lead to a week's change in the average timing of events for both plants and birds, though individual species may respond much more than this. The changes since the last ice age have led to continual change in the wildlife that can survive here, and this process continues. Seasonal change, such as the very cold spring this year, can have a much more dramatic effect on bird populations, and I show in the table below the climate figures for each season for the past decade. They make it clear that spring has been warming rapidly, and that summer is becoming wetter, but that the other seasons remain stable.

	2004	5	6	7	8	9	10	11	12	2013
Winter C°	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.9
Spring C°	12.9	13.0	13.1	13.1	13.2	13.3	13.3	13.3	13.3	13.5
Summer C°	20.3	20.3	20.3	20.2	20.2	20.3	20.3	20.4	20.4	20.5
Autumn C°	14.2	14.3	14.4	14.4	14.4	14.4	14.4	14.5	14.5	14.5
Winter, mm	87	86	87	89	88	88	86	87	87	87
Spring mm	65	65	67	68	69	68	67	64	65	63
Summer mm	66	66	67	68	69	70	70	72	74	74
Autumn mm	91	92	91	91	93	95	95	93	94	94

“Grey Daggers and Minotaurs in Greenwich Park” by John F Burton A review by Richard Bland

There are few functions closer to the nature of humanity than the keeping of records. I rather suspect that the Lascaux cave paintings were basically a game bag and the only way to be sure that the past was real is to record the present. John was caught by the wonder of the natural world at an early age, and proceeded almost at once to recognise that it was vital to understanding to record what was where. His enthusiasm, and his drive to identify everything and to seek to understand its relationship to everything else, combined to lead him, by strokes of good fortune and the wisdom of many of the more senior individuals to whom he pays tribute, to play a very significant role in the development of natural history in the second half of the twentieth century.

This book is a deeply personal account of the early part of this journey, tinged inevitably with that most human sense of loss, nostalgia. The myth of the Golden Age affects us all, but Darwin long since made it clear that the natural world, upon which we are totally dependent, is an interactive process which binds us all. John played a significant part in popularising an understanding of the natural world, and of the threats that human activities posed to it, and hence to the future of humanity. The huge increase in the role of environmental issues in politics is a direct response to this wider understanding, which gives some reasons for hope for the future.

A distinctive feature of this account is that it deals with wildlife in an urban habitat, a habitat as distinctively peculiar as that of a desert, demanding great adaptation and particular skills. Given the growth of urbanisation world-wide the wildlife that

cannot just survive but thrive in this environment has a significant role to play in future. And it is striking feature of the modern world that, because urban habitats are so varied, urban biodiversity is often much greater than that in country areas where economic forces create huge pressures towards monocultures. The notion of re-wilding the countryside is akin to that of re-greening of towns. Both derive from a recognition that humanity has a crucial role to play in ensuring not just the survival of Tigers, but also that of Sparrows.

This book is not just a unique window on the past, but an invaluable guide to the values and understanding that have built the present, and hence a guide to the future. It should be on every naturalist's bookshelf.



The Bristol Onion. C Westcott

Obituaries

Barry Harper 1942 -2013

A long standing member of the British Entomological & Natural History Society (BENHS) and the Bristol Naturalists' Society (BNS), Barry Harper died in his home city of Bristol in 2013. A rather private man, Barry was an only child, raised in the south of Bristol. He never married nor owned a car and perhaps consequently, had an encyclopaedic knowledge of public transport timetables. He was of an enquiring mind and soon developed an interest in wildlife, especially in butterflies, bringing home larvae and pupae in order to see what emerged. Moths did not interest him. He loved walking and soon exhausted his nearby slopes such as Dundry Hill on the southern edge of Bristol and so travelled further afield to places such as Cheddar often walking much of the way home across country, a very considerable distance. In his younger days he was able to visit nearby localities for such species as the Marsh Fritillary, now sadly built over.

After leaving school, Barry started work at Colthurst and Harding paint wholesalers but soon, wishing to explore wider horizons, joined the RAF for 10 years as a clerical worker where his lepidoptera watching interests were soon expanded when stationed around the world, including North Africa. He returned home to live with his parents and encouraged them, via package tour travel, to visit several destinations in Europe and especially to his favourite Switzerland and Austria sometimes bringing home seeds of plants and livestock of lepidoptera to rear. His particular favourites were the blues and Clouded Yellow species, rearing many in captivity. His career after leaving the RAF was initially with Bristol City Council before becoming a rent collector which allowed him more opportunity to be outdoors.

A member of the Amateur Entomologists Society he often travelled by train to the society Annual Exhibitions in London, particularly to purchase butterfly livestock. In the 1970s and 1980s he was active in the Entomology Section of the BNS and visits to the AES Exhibition were facilitated by the Section hiring a minibus, the scene of much enjoyable lepidoptera talk and banter on the way. Latterly he travelled with Graham Best and others by car often meeting former members there.

As a member of the BNS, Barry contributed butterfly records to the annual insect reports from 1972 to 1985 and himself wrote the Butterfly Report in the BNS Proceedings in 1978, 79 and 80. He also exhibited at the annual Entomology Section Members Day held at Bristol City Museum & Art Gallery at that time.

His long interest in butterflies never left him and is reflected in the very generous legacy left to both the BENHS and the BNS.

Graham Best and Ray Barnett

Justin Smith 1967 – 2014

Mandy Leivers

Justin Smith, was one of the best naturalists I've ever met. It's hard to know where to begin when charting his achievements because Justin was a busy man and has accomplished so much in his life. He began studying fungi when he was 14, encouraged by his mother, Eva. His passion for the natural world grew and led him to study geology at Exeter University. After graduating he built his skills through working with the British Trust for Conservation Volunteers, and as an ecological surveyor, before joining Avon Wildlife Trust.

As a member of the British Mycological Society, British Lichen Society, British Bryological Society and North Somerset Fungus Group his knowledge of fungi, lichens and bryophytes (mosses and liverworts) was astounding. The awesome thing about Justin was how generous he was with his time and knowledge. He was such a sociable, funny and friendly guy with a huge passion and talent for teaching others about the natural world. Whilst fungi may have been his first love, Justin had broad interests including hoverflies, ferns, trees, ancient woodland, and grassland ecology. Through all of the guided walks, talks and courses that he's given to the public, the training sessions for Wildlife Trusts, university students and ecologists, Justin has taught and inspired thousands of people.

You could point to any fungus, lichen or lower plant and he could tell you what it was called embellished with some amazing fact about why it was called that, it's diagnostic features, associated uses, ecology or folklore. He had a huge amount of patience and a great interest in helping others. For nearly five years he worked for Natureworks, an organization set up to train people recovering from mental illness, in horticulture, nature conservation and land-based skills. He also supported and trained people on the New Deal scheme at Avon Wildlife Trust and in his most recent job as the Bristol City Council Woodland and Wildlife officer he's been managing the team which undertakes habitat management work on BCC sites. Some of the team are ex-offenders and people on community payback. Justin felt strongly that with support and new skills that this scheme can help people get back on track, and back into work.

As an ecological surveyor Justin has helped protect fungi, lichens and bryophytes not just in our area but across the UK and internationally in countries such as Germany, Chile and Argentina. He also worked with Bristol University to create a systematic method of fungus recording and has been working with Natural England and Kew Gardens to compile a list of sites to be considered as SSSIs for their rare fungi. Justin's passing leaves a huge hole in the natural history world. I don't think there will ever be anyone quite like our 'Fungi Justin'. Justin Smith - Mycologist, Lichenologist, Bryophyte specialist, geologist, biological surveyor, researcher, trainer, walk leader, mentor, musician, husband, father, son and a wonderful friend.

Dr GA Kellaway 1914-2013

D T Donovan

Geoffrey Kellaway, who died in Sussex on 18th September 2013, aged 99, owed much to the Bristol Naturalists' Society. He first appears in the list of members for 1930 living in Howard Road Westbury Park, and at the time he was 16. He was soon in touch with JW Tutchter (1858-1951) a distinguished amateur geologist. At the time Henleaze and Southmead were being developed and excavations revealed the underlying geology, and Tutchter taught him about the rocks and their fossils, and encouraged him to write his first paper published in the proceedings for 1932 on "The Rhaetic and Liassic rocks of Henleaze and Southmead". In 1932 he went to Bristol University to study geology and by 1936, when he graduated with a first he had written two more papers. He then won a Churchill Scholarship to study periglacial phenomena in Alaska. He joined the Geological survey of Great Britain in 1937, and stayed with them until his retirement in 1974. During the war he was sent to Northamptonshire to study the ironstone field, and in 1943 he began with Frank Welch (1903-1987) to re-survey the Bristol and Somerset coalfield. The Bristol District Special Sheet was published in 1962 at the one inch to a mile scale.

An important initiative concerned the mapping of the Carboniferous Limestone so well seen in the Avon Gorge, and Cheddar Gorge and Burrington Combe on the Mendips. In 1906 Arthur Vaughan had subdivided this into five zones based on fossil corals and brachiopods, (PBNS 1906), and these zones were widely used by other geologists in several parts of the United Kingdom. However in 1955 Kellaway and Welch wrote "The writers have not found it possible to give a satisfactory description of the stratigraphy (of the Carboniferous Limestone) using Vaughan's zonal terms." A formal description was then given of a new subdivision, based on rock type, which had been used in the mapping.

Deep mining in the Somerset coalfield had begun in the late eighteenth century and the coal seams were known by local names. Detailed records of the seams and other strata were kept at least from the early nineteenth century. Kellaway made it his business to collect all the shaft records he could find thus making it possible to correlate seams from pit to pit and build up a picture of the coalfield as a whole. His meticulous approach did not facilitate rapid production of the Bristol District volume but it did finally appear after his 79th birthday, and six years after the death of his co-author. (Kellaway and Welch 1993). It contains a vast amount of geological information in its 199 pages.

After his retirement in 1974 he became geological adviser to Bath City Council. The spa fed by the famous hot springs had had to be closed in 1978 after the death of a child from an amoeboid infection contracted at the baths. Kellaway led a multi-disciplinary team to investigate the problem and devised a way of tapping the springs at depth by drilling an inclined borehole so that an uncontaminated supply of hot water could be restored. His account of this was published in a book *The Hot Springs of Bath* edited by him and published by Bath Corporation in 1991.

A more controversial topic was his interest in the provenance of the stones of Stonehenge. It had long been known that one group of stones, the 'bluestones', are made of igneous rock which does not occur in southern England. In 1923 another Geological Survey officer, HH Thomas, had tracked them down to north Pembrokeshire in Wales. But how did they get to Salisbury Plain? Glacial transport had been suggested as early as 1902. The idea was taken up with enthusiasm by Kellaway, who offered supporting evidence, and his paper was published in nature in 1971. The theory has been popular among archaeologists because it solves a problem for them. Geologists on the whole have remained more sceptical.

Annual report for 2013

As usual the society organised almost 80 events, over fifty of them being out in the field. It was also increasingly involved in a variety of activities organised by other organisations, especially the series of Bioblitz events organised by the Bristol Natural History Consortium which sought to visit a wide variety of the 99 Sites of Nature Conservation Interest within the city. It also cooperated actively with the new wildlife programme *Shepherds Way* broadcast every Wednesday evening by BCFM radio. It continues to be involved in national surveys organised by the BTO.

Botanical Section

The AGM was held on 28th January and Peter Hilton and Clive Lovatt were elected as president and secretary respectively. There were five indoor meetings including a conifer workshop, a lecture on species evolution on the Azores, a meeting dedicated to the botany of the Downs, and a lecture on the Wild Asparagus. There were 13 field meetings including a Downs Lichen trail, Sneyd Park and Bishops Knoll reserves, Campbells Farm, Trees at the Royal Fort gardens, Brislington Brook, Cadbury Camp, Henbury Golf Course, Dundry, Shapwick, Tucking Mill, Sand Bay, Tanpit Woods and urban Portishead. Members were involved with BNHC Bioblitz events at Kings Weston, where they helped establish a tree trail, Arnos Vale cemetery, and the Downs.

Geological Section

The AGM held on 30th January elected Roger Steer and Richard Ashley as president and secretary. There were four lectures on Lyme Regis, Ichthyosaurs, the environmental impact of Mendip lead mining and the Bristol Museum collections. There were nine field meetings visiting Browns Folly, Writhlington Batch, the Westbury White Horse, Coalpit Heath, Clevedon beach, The Mendips, Gower, and Moons Hill Quarry, and there was a five day visit to the North Pennines. These meetings were arranged jointly with Bath Geological Society and the West of England Geological Association.

Invertebrate Section

The AGM was held on 3 February, and Mark Pajak and Tony Smith were elected president and secretary respectively. There was one lecture, on Scarab Beetles, and eight field meetings to the Gully, Leigh Woods, Shapwick Heath, Trendlewood Park, Moorend Spout, Little Wood near Yatton, Filmore Woods near Thornbury, and Abbots Pool.

The section also assisted with six Bioblitz events organised by the BNHC, at Kings Weston, Dundry slopes, Narrowways Junction, Troopers Hill, Royate Viaduct, and Arnos Vale Cemetery, and at other events at Bedminster, Westbury on Trym, the Downs, and meetings of the Amateur Entomologists Society and the British Entomological Society. Mark Pajak has become a regular contributor to Shepherds Way, a weekly radio programme at BCFM

Mammal Report

The mammal group has finally become a section. The AGM was held on Feb 18th, and R Coffin, H Broughton, and R Symes were elected to the committee. Dormice were monitored in Leigh Woods, a Bristol Otter group training day was held, and a Bat talk.

Ornithology section

At the AGM on Jan 9th Michael Johnson was elected president, and Becky Coffin retired as Secretary. Five indoor meetings were held, on the people and birds of St Kilda, Birds of the Falkland Islands, birds of Cuba, birds of Eastern Europe, and the natural History of Blagdon Lake. 13 Field meetings were held, visiting the Golden Valley at Wick, Somerset Levels Starling roosts, Marshfield, Frome Valley, Eastwood Farm, Ham Wall, Blaise, the Newport Wetlands, Portbury Wharf, Stockwood, Chew Lake, a migration watch at Aust, and the Greylake reserve. Members were involved in the BTO's Winter Thrush Survey and the Breeding Bird Survey, and the local and national Garden Bird Survey, a breeding Swift survey and a Corn Bunting survey.

General Walks

Eleven mid-week walks were held on the first Thursday of the month. They visited Ashton Court estate, Dolebury woodland, Crook Peak, Kelston Round Hill, Hawkesbury Upton, Cadbury Camp, Arlingham, Littleton upon Seven, the Dundry circuit, Cheddar Gorge and Berkeley deer park. One of the Walks was also part of the Bristol Walks Festival in May.

The Reading Group

The first book was the *Driving Force* by M Crawford, which examines the relationship between food, chemistry, and the evolution of roles such as herbivore and carnivore in animals. Then the *Curious Naturalist* by N Tinbergen, whose work on animal behaviour was fundamental to understanding the natural world in the 1950s. *Darwin and the Barnacle* by R Stott looks at the eight years Darwin spent studying Barnacles around the world prior to writing the Origin of Species. Finally *Life, an unauthorised biography* by R Fortey, an account of the development of life on earth.

Financial Report for the year ended 31 December 2013

		2013	2012
Income			
Membership Subs		7582.00	7584.00
Gift Aid		1491.96	1387.07
Donations		510.00	470.00
Trading		288.30	58.52
Interest		212.98	381.07
Misc		79.00	100.00
Total		10,164.24	9,980.66
Expenditure			
A Charitable			
Meetings		1285.50	1612.81
Books		632.63	712.14
Nature in Avon		1540.00	1540.00
Bird Report		1600.00	1536.00
Bulletin		1322.01	1323.22
Distribution		1636.09	1535.21
subscription		83.00	63.00
150 Event			1492.72
Publicity		579.80	756.42
Total		8679.83	10,571.52
B Administration			
Print, Stationery		77.87	80.66
Postage		49	111.49
Council room hire		270	240
Insurance		125.87	157.92
Misc		1095.59	127.79
Total		1618.59	717.86
Operating surplus n(deficit)		-133.38	-1308.72
Grants awarded		6250	2740
Bequest		125,500	
Funds movement		119,116.62	-4048.72

Instructions for authors

The editor welcomes original papers or short notes on the natural history of the greater Bristol region for consideration for publication in Nature in Avon. All papers for consideration should reach the editor by the end of March. All Society Reports and Biota should reach the editor by the end of February in the year of publication.

Whenever possible, text should be submitted electronically in Word. The data for graphs should be sent in Excel, separately from the graph, as graphs have to be recreated to fit the page size of the journal. Any other illustrations should be submitted electronically.

The Editor welcomes digital photos of any natural history subject taken in the region, whether relevant to an article or not. They should be of the largest pixel size possible. However as the number of colour illustrations is strictly limited he cannot promise to print any

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Rerum cognoscere causas – Virgil
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